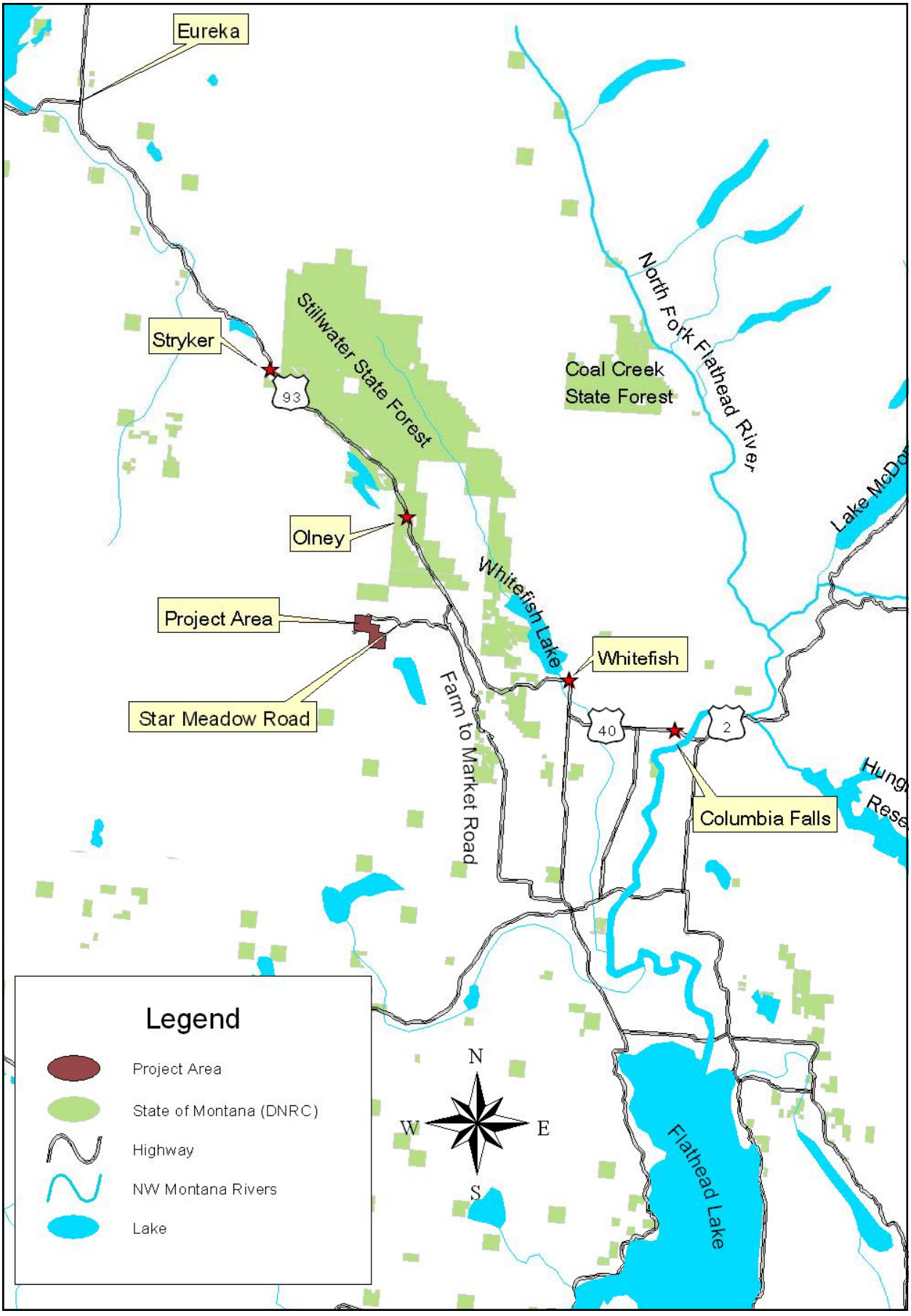


SHORTS MEADOW/EVERS CREEK TIMBER SALE PROJECT ENVIRONMENTAL ASSESSMENT

March 30, 2007

Department of Natural Resources and Conservation
Stillwater Unit


Eureka
Stryker
93
Stillwater State Forest
Coal Creek
State Forest
North Fork Flathead River
Olney
Whitefish Lake
Project Area
Star Meadow Road
Farm to Market Road
Whitefish
40
2
Columbia Falls
Flathead Lake
Legend
Project Area
State of Montana (DNRC)
Highway
NW Montana Rivers
Lake
N
W
E
S

FINDING

PROPOSED SHORTS MEADOW/EVERS CREEK TIMBER SALE PROJECT

STILLWATER STATE FOREST

An Interdisciplinary Team (ID Team) has completed the Environmental Assessment (EA) for the proposed Shorts Meadow/Evers Creek Timber Sale Project.

The project area is located approximately 11 miles west of Whitefish in all or portions of Sections 13, 14, and 24, Township 33 north (T33N), Range 24 west (R24W). The trust beneficiaries involved in the proposed actions are the School for Deaf and Blind and Public Buildings.

After a thorough review of the EA, project file, public correspondence, Montana statutes, State Forest Land Management Plan (SFLMP), and adopted rules, I have made the following 3 decisions:

1. ALTERNATIVE SELECTED:

Two alternatives are presented and were fully analyzed in the EA:

- The No-Action Alternative includes existing activities, but does not include a timber harvest.
- The Action Alternative proposes to:
 - harvest a minimum of 2 million board feet (MMbf) of sawlogs from 450 acres;
 - remove trees susceptible to root rot diseases and insect infestations;
 - promote regeneration of tree species less susceptible to diseases and insects;
 - upgrade surface drainage of some stretches of road to meet Best Management Practices (BMPs);
 - apply treatment to reduce forest fuel to decrease the risk of wildland fire on State lands; and
 - construct a portion of road that is involved in an easement shared with landowners in Section 24, T31N, R24W; thus, DNRC's costs associated with the road easement would be covered.

I have selected Action Alternative with the following rationale:

- The Action Alternative meets the *PURPOSE OF PROPOSED ACTION (EA, Page I-1)* and *OBJECTIVES OF PROPOSAL (EA, Page I-2),* where the specific project objectives are listed.
- The lands involved in this project are held by the State of Montana in trust for the support of specific beneficiary institutions. DNRC is required by law to administer these trust lands to produce the largest measure of reasonable and legitimate return over the long run *(Enabling Act of February 22, 1889, 1972 Montana Constitution, Article X, Section 11;* and *77-1-202, Montana Codes Annotated [MCA])*. The SFLMP and associated rules provide the management philosophy and framework to evaluate which alternative would maximize real income while sustaining the production of long-term income.
- On March 13, 2003, the Department adopted *Administrative Rules for Forest Management* (*ARM 36.11.401* through *450*). This project is de-

signed in accordance with *Forest Management Rules*.

- The proposed timber sale project contributes to harvest levels mandated by State Statute (*MCA 77-5-222).*
- DNRC is required to salvage timber damaged by insects, diseases, fires, or wind before the timber loses value to decay, provided such harvesting is economically warranted (*MCA 77-5-207*).
- The analyses of identified issues did not reveal information to persuade the Department to choose the No-Action Alternative prior to this decision.
- The Action Alternative includes activities to address concerns expressed by the public, which include, but are not limited to, the following:

 1) The project does not harvest in identified old-growth stands.
 2) The project is designed to address several aesthetic issues related to timber harvesting.
 3) Stream buffers and the levels of tree retention addressed in the Streamside Management Zone (SMZ) Law will be followed; additional trees and shrubs will be retained in the Wetland Management Zones and Riparian Management Zones.
 4) An adequate number of snags and live recruitment trees will remain to provide for important wildlife habitat, down woody debris, and shading for streams.
 5) Haul routes will meet BMPs.
 6) The risk of wildfire will be reduced on State lands.
 7) The estimated total timber-dollar revenue to the State is more than $681,000.

2. SIGNIFICANCE OF IMPACTS

For the following reasons, I find that the Action Alternative will not have significant impacts on the human environment:

- No impacts are regarded as severe, enduring, geographically widespread, or frequent. Further, the quantity and quality of various resources, including any that may be considered unique or fragile, will not be adversely affected to a significant degree. I find no precedent for future actions that would cause significant impacts and no conflict with local, State, or Federal laws, requirements, or formal plans. In summary, I find that the identified adverse impacts will be avoided, controlled, or mitigated by the design of the project to the extent that the impacts are not significant.
- Locally Adopted Environmental Plans and Goals – In June 1996, DNRC began a phased-in implementation of the SFLMP. The SFLMP establishes the Agency’s philosophy for the management of forested trust land. In May 2003, DNRC adopted rules concerning the SFLMP. The SFLMP philosophy and associated Forest Management Rules are incorporated in the design of the proposed project.
- Recreational Activities – Recreational opportunities will continue and will not be negatively affected by the proposed project.
- Precedent Setting and Cumulative Impacts – The project area is located on State-owned lands that are “principally valuable for the

timber that is on them or for growing timber or for watershed protection" (*MCA 77-1-402*).

- Taken individually and cumulatively, the proposed activities are common practices, and no project activities are being conducted on important fragile or unique sites.
- The proposed timber sale project conforms to the management philosophies of DNRC and is in compliance with existing laws, rules, policies, and standards applicable to this type of proposed action.

SHOULD DNRC PREPARE AN ENVIRONMENTAL IMPACT STATEMENT (EIS)?

Based on the following considerations, I find that an EIS does not need to be prepared:

- The EA adequately addresses the issues identified during project development and displays the information needed to make the decisions.
- Evaluation of the potential impacts of the proposed Shorts Meadow/ Evers Creek Timber Sale Project indicates that no significant impacts would occur.
- The ID Team provided adequate opportunities for public review and comment. Public concerns were incorporated into the project design and analysis of impacts.

Michael J. McMahon

Forest Management Supervisor
Stillwater State Forest
April 3, 2007

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PREPARERS AND CONSTIBUTORS

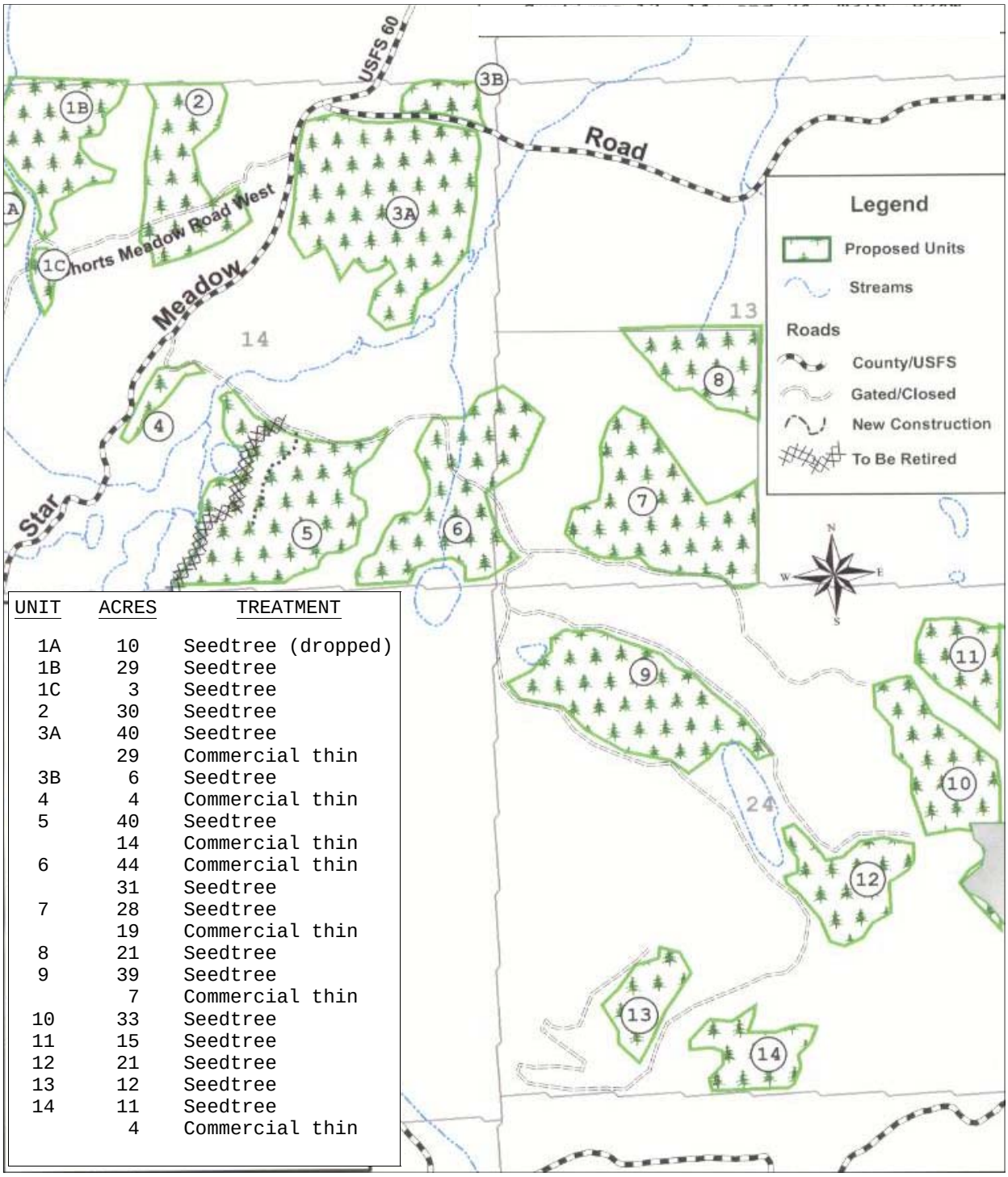
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ACRONYMS (front of back cover)

PROPOSED SHORTS MEADOW/EVERS CREEK TIMBER SALE PROJECT AREA MAP
Sections 13, 14, and 24, T31N, R24W



UNIT	ACRES	TREATMENT
1A	10	Seedtree (dropped)
1B	29	Seedtree
1C	3	Seedtree
2	30	Seedtree
3A	40	Seedtree
	29	Commercial thin
3B	6	Seedtree
4	4	Commercial thin
5	40	Seedtree
	14	Commercial thin
6	44	Commercial thin
	31	Seedtree
7	28	Seedtree
	19	Commercial thin
8	21	Seedtree
9	39	Seedtree
	7	Commercial thin
10	33	Seedtree
11	15	Seedtree
12	21	Seedtree
13	12	Seedtree
14	11	Seedtree
	4	Commercial thin

CHAPTER I
PURPOSE AND NEED

INTRODUCTION TO PROPOSED ACTION

The Department of Natural Resources and Conservation (DNRC), Stillwater Unit, is proposing the Shorts Meadow/Evers Creek Timber Sale Project. The project proposes to harvest timber, reduce forest fuel loading, and improve surface drainage on road systems.

The gross project area encompasses approximately 1,440 acres. The lands involved in this project are held by the State of Montana in trust for the support of the School for the Deaf and Blind (Section 13, T31N, R24W) and Public Buildings (Sections 14 and 24, T31N, R24W).

The project area is 11 miles west of Whitefish and 0.75 mile northwest of Talley Lake.

Two alternatives, an action and a no-action, are being analyzed. If the action alternative were selected, an estimated 2 to 3 million board feet (MMbf) of timber would be harvested from approximately 448 acres of the analysis area. Seedtree and commercial-thin silvicultural treatments would be utilized for this harvest. An existing right-of-way passes through proposed Unit 5. If the action alternative were selected, 1,200 feet of low-standard road would be constructed for seasonal use and the existing road near Evers Creek would be reclaimed to fulfill the State's obligations in regard to that right-of-way.

PURPOSE OF PROPOSED ACTION

The lands involved in the proposed project are held in trust by the State of Montana for the support of specific beneficiary institutions, such as public schools, State colleges and universities, and other specific State institutions, such as the School for the Deaf and Blind (*Enabling Act of February 22, 1889; 1972 Montana Constitution, Article X, Section 11*). The Board of Land Commissioners (Land Board) and DNRC are legally required to administer these trust lands to produce the largest measure of reasonable and legitimate long-term return for these beneficiary institutions (*Section 77—1-202, Montana Codes Annotated [MCA*]).

On May 30, 1996, DNRC released the Record of Decision on the State Forest Land Management Plan (SFLMP). The Land Board approved the SFLMP's implementation on June 17, 1996. On March 13, 2003, DNRC adopted Administrative Rules (Forest Management Rules) (*Administrative Rules of Montana [ARM] 36.11.401 through 450*). The SFLMP outlines the management philosophy, and the proposal will be implemented according to the Forest Management Rules. The philosophy is:

> *"Our premise is that the best way to produce long-term income for the trust is to manage intensively for healthy and biologically diverse forests. Our understanding is that a diverse forest is a stable forest that will produce the most reliable and highest long-term revenue stream… In the foreseeable future, timber management will continue to be our primary source of revenue and our primary tool for*

achieving biodiversity objectives."

OBJECTIVES OF PROPOSAL

To meet the goals of the management philosophy adopted through a programmatic review of the SFLMP, DNRC has set specific objectives for the Shorts Meadow/Evers Creek Timber Sale Project:

- Generate revenue for the school trust by harvesting 2 to 3 MMbf of sawtimber. As mandated by *State Statute 77-5—222 MCA*, the proposed harvest would also contribute toward meeting DNRC's requirements for sustained yield.
- Improve the long-term productivity of timber stands by increasing vigor, reducing incidence of insect infestations and disease infections, and regenerating portions of the stands where growth rates are decreasing. Actions would be done in a manner that maintains site productivity and favors the retention and regeneration of appropriate species mixes (*ARM 36.11.405*).
- Reduce the risk of wildfires to State trust lands and adjacent landowners by reducing forest fuel loadings.

ENVIRONMENTAL ASSESSMENT (EA) PROCESS

EA DEVELOPMENT

This EA was prepared in compliance with the Montana Environmental Policy Act (MEPA) of 1971. The intent of MEPA is to foster better decisions and wise actions by ensuring that relevant environmental information is available to public officials and citizens before decisions are made and actions are taken. MEPA requires State government to consider environmental impacts in its decisionmaking process.

PUBLIC SCOPING

The public scoping process begins during the initial stage of an EA and is used to inform the public that a State agency is proposing an action. The public has opportunity to express comments or concerns about the possible impacts of the project.

In June 2006, DNRC solicited public participation on the Shorts Meadow/ Evers Creek Timber Sale Project by advertising in the Tobacco Valley News and Whitefish Pilot and mailing the initial proposal with maps to individuals, agencies, industry representatives, and other organizations that have expressed interest in Stillwater State Forest's management activities. The mailing list developed for this project is located in the project file.

The public-comment period for the Initial Proposal was open for 30 days. Comments were received in the forms of 2 letters, 2 phone calls, and 4 e-mails. A field tour of the project area was conducted with interested individuals; their comments were put on record.

INTERDISCIPLINARY TEAM (ID TEAM)

The ID Team, comprised of DNRC's wildlife biologist, hydrologist, and several foresters, identified and summarized issues and concerns raised during the public-scoping period. The issues and concerns identified through the period of public involvement are summarized in this chapter. The original comments received during the comment period are also located in the project file at the Stillwater State Forest office in Olney.

In November 2005, the ID Team began to compile issues and gather information related to current conditions, activities that are required by the Forest Management Rules. Comments received from the public and other agencies were also utilized in developing the timber sale project and access issues.

These issues were considered when the ID Team discussed alternative development. Based on input, the ID Team and decisionmaker made the decision to analyze the effects of 2 alternatives, an action and a no-action alternative.

DECISIONS TO BE MADE

The following decisions are to be made as a result of this EA and will be incorporated into the Finding.

- Do the alternatives presented meet the objectives?
- Does the selected alternative have significant effects on the human environment?
- Should an Environmental Impact Statement (EIS) be prepared?

PROPOSED SCHEDULE OF ACTIVITIES

If the action alternative is selected to be implemented in the finding, a timber sale contract will likely be prepared in the spring of 2007.

The contract package would be tentatively scheduled for presentation to the Land Board in the spring of 2007. If the Land Board approves the package, the timber sale would be advertised for bid. Harvesting and roadwork under the contract package would occur over a single 3-year period. Postharvest activities such as site preparation, planting, and hazard reduction would occur following the harvesting activities.

OTHER AGENCIES WITH JURISDICTION/ PERMIT REQUIREMENTS

DEPARTMENT OF FISH, WILDLIFE AND PARKS

A Stream Protection Act Permit (124 Permit) is required from DFWP for activities that may affect the natural shape and form of a stream's channel, banks, or tributaries.

MONTANA DEPARTMENT OF ENVIRONMENTAL QUALITY (DEQ)

A Short-Term Exemption from Montana's Surface Water Quality Standards (318 Authorization may be required if temporary activities would introduce sediment above natural levels into streams. DEQ would issue this permit at the recommendation of DFWP.

MONTANA AIRSHED GROUP

DNRC is a member of the Montana Airshed Group, which regulates slash burning done by DNRC. DNRC receives an air-quality permit through participation in the Montana Airshed Group.

OTHER ENVIRONMENTAL REVIEWS RELATED TO THE PROJECT

To address direct, indirect, and cumulative effects to resources on a landscape level, resource analyses will consider the required potential effects from past, present, and future actions to resources within the defined analysis area. The Shorts Meadow/Evers Creek Timber Sale Project analysis utilizes information from historical sales to examine the conditions of wildlife and cultural resources in the existing environment, but does not tier to any specific analysis.

Portions of the *Shorts Meadow Timber Sale Project* completed in 1997, the *Shorts Rainbow Reciprocal Access Project (2002)*, and the *Logan Creek Ecosystem Restoration Project (February 2004)* are within and adjacent to the project area.

ISSUES AND CONCERNS

Throughout the scoping process, resource specialists of DNRC and other agencies and the public raised concerns about the project's potential impacts on the environment. DNRC considered these concerns in the development of project alternatives (see *CHAPTER II - ALTERNATIVES*). A summary of the issues addressed in this Environmental Assessment (EA) are presented by resource in *TABLE I-1 – SUMMARY AND TRACKING OF ISSUES AND CONCERNS FROM PUBLIC COMMENTS.*

TABLE I-1 – SUMMARIZATION AND TRACKING OF ISSUES AND CONCERNS

RESOURCE AREA	CONCERN OR ISSUE	WHERE ADDRESSED IN EA PACKAGE
Vegetation	The timber harvest and proposed prescriptions have the potential to increase fire hazards from logging slash.	Pages III-8 and III-9
	Insect infestations have had varying levels of effect on stand health in the project area. Timber harvesting and the treatment of slash have the potential to improve these circumstances.	Table II-2 on Page II-7; Pages III-6 and III-7
	Timber harvesting in stands of old-growth timber may affect the amount and distribution of old growth remaining on Stillwater Unit.	Dismissed - See Page I-6
	Disturbances from timber harvesting and the potential increases and/or decreases in water levels could have an effect on sensitive plants located within the Shorts Meadow/Evers Creek sections.	Dismissed - See Page I-6
	Soil disturbances and logging equipment could increase the amount and distribution of noxious weeds in the project area.	Table II-2 on Page II-9; Page III-9 and III-10
	Disturbances from timber harvesting could increase root disease and insect infestation in remaining trees.	Table II-2 on Page II-7; Pages III-9 and III-10
Water Quality and Water Yield	Timber harvesting and road construction have the potential to increase water yield, which, in turn, may affect stream-channel stability.	Table II-2 on Page II-8; Pages III-14 through III-16
	Tree canopy removal due to timber harvesting and road construction may increase sediment delivery to streams and affect water quality.	Table II-2 on Page II-8; Pages III-14 through III-16
Soils	Timber harvesting may result in changes to the physical properties of soil due to compaction and displacement.	Table II-2 on Page II-9; Pages III-19 through III-20

RESOURCE AREA	CONCERN OR ISSUE	WHERE ADDRESSED IN EA PACKAGE
Fisheries	Actions related to the proposed timber sale may increase sediment delivery and adversely affect stream temperatures, stream shading, stream sediments, and recruitable large woody debris in Evers Creek, Logan Creek, and North Fork Evers Creek.	Table II-2 on Pages II-9 and II-10; Pages III-24 and III-25
Aesthetics	Logging along roadways would impact visuals.	Table II-2 on Page II-10; Pages III-26 and III-27
Economics	The amount of money this sale can generate for the trust beneficiaries is primarily an issue that needs to be addressed for decisionmaking.	Table II-2 on Page II-10 and II-11; Pages III-28 and III-29
Wildlife	Timber harvesting could reduce habitat available for bald eagles in the Tally Lake home-range territory.	Dismissed - See Page I-6
	Timber harvesting could remove important structure and canopy cover used by fishers, thereby reducing fisher habitat in the area.	Table II-2 on Page II-13 and II-14; Pages III-32 and III-40 and III-41
	Timber harvesting and road construction could displace grizzly bears from important habitats and/or reduce grizzly bear security by reducing hiding cover and visual screening.	Table II-2 on Page II-13; Pages III-38 and III-39
	Timber harvesting could remove snags and snag-recruitment trees needed by pileated woodpeckers and other wildlife species, resulting in decreased habitat availability for these species.	Table II-2 on Page II-11; Pages III-33
	Timber harvesting and road management could disrupt white-tailed deer migration to their winter range.	Table II-2 on Page II-15; Pages III-42 through III-44
	Timber harvests could disrupt connectivity of habitats used by forest-dwelling species.	Pages III-42 through III-44

RESOURCE AREA	CONCERN OR ISSUE	WHERE ADDRESSED IN EA PACKAGE
Wildlife	Unrestricted motorized access could lead to avoidance of adjacent habitats.	Table II-2 on Page II-13; Pages III-38
	Timber harvests could reduce the amount and quality of old-growth habitat, thereby reducing habitat for old-growth-associated species.	Dismissed - See Page I-6.
	Timber harvests could remove or change lynx habitat.	Table II-2 on Page II-12; Pages III-35 and III-36
	Timber harvests could improve habitat conditions, but could also result in the reduction of important habitat components for flammulated owls.	Dismissed - See Page I-6

ISSUES DROPPED FROM FURTHER CONSIDERATION

OLD GROWTH

The DNRC definition of old growth are those stands having the minimum number of trees per acre that have a minimum dbh and a minimum age for a given site. These minimums are listed in *Old Growth Forest Types of the Northern Region* (*Green et al 1992*), although some minor adaptations have been made due to data compatibility. Within the Stillwater Unit Analysis area, *STW 2006 Stand Level Inventory (SLI)* data was reviewed. Models within the SLI identify stands that have the potential of meeting DNRC's old-growth definition. Within proposed project areas, field verification is conducted with either reconnaissance surveys or plot surveys. Information gathered would update or change SLI data as habitat types, live trees per acre, age of overstory, number and size of snags, etc.

Using SLI data, no old growth was identified in the Shorts Meadow/ Evers Creek Project area; the nonpresence of old growth was confirmed with field reconnaissance.

SENSITIVE PLANTS

The Montana Natural Heritage Program was consulted to determine if any sensitive plants are known to be present in the project area; none are present.

BALD EAGLE

The project area falls at the edge of the 2.5-mile radius of the home range and accounts for 305 acres of the 12,566-acre home range (2.4 percent). All proposed activities (approximately 85 acres) occur at least 2 miles from the nest location. Therefore, disturbance to nesting eagles that could result in nest failure or abandonment is highly unlikely. Additionally, the project area does not contain any known key feeding sites (lakes, streams, potholes, ground squirrel colonies, etc.) or big game winter range that provide important food sources needed by the Tally Lake breeding pair for successful reproduction. Therefore, neither alternative is expected to affect bald eagles.

FLAMMULATED OWLS

No flammulated owl habitat is present within the project area.

CHAPTER II
ALTERNATIVES

INTRODUCTION

Chapter II describes alternatives for the Shorts Meadow/Evers Creek Timber Sale Project and summarizes the predicted effects of implementing each alternative. Included is a summary of the alternative-development process that occurred on this project. *TABLE II –2 - SUMMARY OF ENVIRONMENTAL EFFECTS* summarizes predicted effects from detailed environmental analyses (see *CHAPTER III – EXISTING ENVIRONMENT AND ENVIRONMENTAL EFFECTS*).

DEVELOPMENT OF ALTERNATIVES

The Shorts Meadow/Evers Creek Timber Sale Project area was proposed for a timber sale project in the fall of 2004. The area was identified for timber harvesting primarily because of the need to reduce fuel loads and stocking densities on State land in the vicinity of private residences in the Shorts Meadow area.

After identifying the project area, this project was included in the Northwestern Land Office (NWLO) 3-year listing of upcoming timber sale proposals. The listing was sent to interested parties. The ID Team began work on the project in the spring of 2006. The role of an ID team is to summarize issues and concerns, develop and define management options, and, in reference to issues, analyze predicted and potential impacts of a proposal on the human and natural environment.

Throughout the year in 2006, ID team members and other DNRC personnel were involved in field reconnaissance and data collection in the project area. Information was collected on:

- existing roads to determine improvement needs for surface drainage, ditch relief, stream crossings, and safety features;
- timber-stand characteristics, presence of old-growth, root disease infections, insect infestations, noxious weeds, and sensitive plant species;
- specific and general watershed characteristics; and
- wildlife and fish habitats.

Field data was used to define the project and analyze the alternatives and their potential effects. Using this information within the framework of the SFLMP and associated Forest Management Rules, an initial proposal was developed. The initial proposal began the public scoping period.

Within the context of public comments, continuing field reconnaissance, and specific resource concerns, the ID Team considered the need or benefit of developing additional alternatives (see *TABLE I – SUMMARY AND TRACKING OF ISSUES AND CONCERNS FROM PUBLIC COMMENTS)*. The ID Team determined that the issues directly related to proposed actions could be addressed through minor changes in the project design and/or mitigation measure. Based on determination of the ID Team, issues and concerns did not drive further alternative development. The ID Team developed an action proposal within the framework of the Administrative Rules for Forest Management.

ALTERNATIVE DESCRIPTIONS

This section describes 2 alternatives, the No-Action Alternative and Action Alternative. The decisionmaker may select a modification or combination of these alternatives.

DESCRIPTION OF THE NO-ACTION ALTERNATIVE

Under the No-Action Alternative, no timber harvesting or timber-management revenue generation for the public school trusts would occur in the Shorts Meadow Timber Sale Project area at this time. Improvements to roads and stream crossings on existing access roads would occur under an existing Temporary Road Use Permit with USFS. The 1,200 feet of road to be built under the Shorts Rainbow Reciprocal Access Project would be built in the future, but the existing road in Unit 5 would not be reclaimed. Salvage logging, firewood gathering, recreational use, fire suppression, noxious-weed control, additional requests for permits and easements, and ongoing management requests may occur. Road maintenance may occur when funding is available. Nonpoint-source sediment-delivery from roads may occur. Seasonal road closures may be installed to protect water quality and investments in road maintenance. Natural events, such as plant succession, tree mortality due to insect infestations and disease infections, windthrow, down fuel accumulation, an in-growth of ladder fuels, and wildfires, would continue to occur. Future proposed management activities, including timber harvesting, would go through the appropriate level of environmental analyses before implementation.

The No-Action Alternative may be used as a baseline for comparing the effects that the Action Alternative would have on the environment and is considered a possible alternative for selection.

DESCRIPTION OF THE ACTION ALTERNATIVE

- **Timber-Management Activities**

 Regeneration harvests by seedtree methods are proposed on approximately 358 acres and commercial-thin methods are proposed on 90 acres. These treatments would remove between 2 and 3 million board feet (MMbf) of timber. Treatments would be accomplished with both ground-based and skyline logging equipment.

 The harvest units that use seedtree treatments would cut all merchantable timber with the exception of 8 to 10 of the larger-diameter western larch, Douglas-fir, and ponderosa pine per acre. The selected seedtrees would show the most vigor, contain the healthiest crowns, and have the potential to produce healthy cone crops. Following machine scarification and the piling of logging slash, Douglas-fir and western larch would be expected to regenerate naturally in these openings. Units 10 and 13, consisting of approximately 44 acres, would be broadcast burned to reduce the harvest-generated logging slash and reduce the natural competition to seedlings that common juniper presents. These proposed units have ponderosa pine in the overstory and would be planted with ponderosa pine seedlings.

 Broadcast burning is dependent upon funding, timing, availability of personnel, and the weather. If broadcast burning efforts do not come together, slash generated from logging would be machine piled and burned.

 In the commercial-thin harvest units, 40 to 60 percent of the trees would be harvested to reduce stocking density, improve growth rates and vigor, and increase the amount of western larch representation in the stand.

Hazard reduction for logging slash would meet the State Hazard Reduction Law. Specifically, areas within 1,000 feet of a residential structure would meet the *High Standard* specification under this law. Around the perimeter of the harvest unit, the entire harvested tree, including the top and branches, would be removed to the landing site.

- **Proposed Silvicultural Treatments**

 If the Action Alternative were chosen, several harvest treatments (silvicultural prescriptions) would be required to meet the desired management objectives. A variation of silvicultural prescriptions within a proposed harvest unit would emulate the effects of mixed-severity and stand-replacement fires across the landscape.

 In some buffer areas adjacent to streams and wetlands, limited harvesting would occur to ensure compliance with the Montana SMZ law.

 Following site preparation and hazard reduction, the proposed silvicultural treatments would leave approximately 10 to 15 tons of coarse woody debris (greater diameter than 3 inches) per acre in harvest units.

 Where available, approximately 2 large snags and 2 large live trees for snag recruits would be retained per acre in harvest units. Silvicultural treatments that would be applied to each harvest unit are specified in *TABLE II-1 PROPOSED SILVICULTURAL TREATMENTS BY UNIT FOR THE ACTION ALTERNATIVE.* The following are silvicultural prescriptions proposed under the Action Alternative:

 - ***Modified Seedtree with Reserves***

 Approximately 8 to 10 large western larch and Douglas-fir trees per acre would be retained, individually and in clumps, to provide future snags, cavity-nesting sites, and a seed source. Existing snags and small clumps of younger trees would also be retained to provide for structural and species diversity.

 - ***Commercial Thinning***

 Forty to sixty percent of the existing overstory would be harvested to reduce stocking density and improve growth rates and vigor. The residual stand would consist of the most vigorous and largest-diameter trees currently on site. Douglas-fir, western larch, and clumps of western red cedar would be the preferred species of retention.

MITIGATIONS

To accomplish the various elements of the proposed project, certain methods or mitigation measures would be designed into the project and applied. Mitigation measures are designed to reduce impacts and protect resources during harvesting and road-improvement activities. Many are written into the Forest Management Rules, but are substantial enough to the design of the project to mention here again. Other mitigation measures pertinent to this project will be tracked in *STIPULATIONS AND SPECIFICATIONS*. Many mitigation measures are designed to be incorporated into the Timber Sale Contract or site-preparation contract clauses and are implemented through contract administration.

WILDLIFE

- Existing closure devices would be reinforced to reduce illegal motorized use.
- Strips of vegetation would be retained along open roads and pockets of regenerating trees and unharvested trees would be retained within all harvest units to break up sight distances where

broken terrain and vegetation outside of the units are insufficient.

- Unit 1A, a 10-acre harvest unit located along the northwestern edge of the project area, was dropped from this alternative to retain a minimum of 5 acres of denning habitat for lynx, thereby complying with *ARM 36.11.436(8)[a]*.

***TABLE II-1 - PROPOSED SILVICULTURAL TREATMENTS BY UNIT FOR THE ACTION ALTERNATIVE* (*Note: Acres and thousand board feet (Mbf) may change based on continuing field work and unit layout*.)**

UNIT #	ACRES	TREATMENT	YARDING METHOD	HARVEST VOLUME (MBF)	SITE PREPARATION AND HAZARD REDUCTION	METHOD OF REGENERATION IN AREAS BEING REGENERATED
1A	10	Seedtree	Tractor		Lop and scatter/ excavator scarify, pile, and burn	Natural regeneration
1B	29	Seedtree	Tractor		Excavator scarify, pile, and burn	Natural regeneration
1C	3	Seedtree	Tractor		Excavator scarify, pile, and burn	Natural regeneration
2	30	Seedtree	Tractor		Excavator scarify, pile, and burn	Natural regeneration
3A	69	Seedtree (40 acres) commercial thin (29 acres)	Tractor		Excavator scarify, pile, and burn	Natural regeneration
3B	6	Seedtree	Tractor		Lop and scatter/ excavator scarify, pile, and burn	Natural regeneration
4	4	Commercial thin	Tractor		Excavator scarify, pile, and burn/lop and scatter	
5	54	Seedtree (40 acres) Commercial thin (14 acres)	Tractor		Excavator scarify, pile, and burn/lop and scatter	Natural regeneration

UNIT #	ACRES	TREATMENT	YARDING METHOD	HARVEST VOLUME (MBF)	SITE PREPARATION AND HAZARD REDUCTION	METHOD OF REGENERATION IN AREAS BEING REGENERATED
6	44	Seedtree (31 acres) Commercial thin (13 acres	Tractor		Excavator scarify, pile, and burn/lop and scatter	Natural regeneration
7	47	Seedtree (28 acres) Commercial thin (19 acres)	Tractor		Excavator scarify, pile, and burn/lop and scatter	Natural regeneration
8	21	Seedtree	Tractor		Excavator scarify, pile, and burn/lop and scatter	Natural regeneration
9	46	Seedtree (39 acres) Commercial thin (7 acres)	Tractor		Excavator scarify, pile, and burn/lop and scatter	Natural regeneration
10	32	Seedtree	Combination tractor and skyline		Broadcast burn	Natural regeneration /interplant western larch and ponderosa pine
11	15	Seedtree	Tractor		Excavator scarify, pile, and burn/lop and scatter	Natural regeneration
12	21	Seedtree	Tractor		Excavator scarify, pile, and burn/lop and scatter	Natural regeneration
13	12	Seedtree	Skyline		Broadcast burn	Natural regeneration /interplant western larch and ponderosa pine
14	15	Seedtree (11 acres) Commercial thin (4 acres)	Tractor		Excavator scarify, pile, and burn/lop and scatter	Natural regeneration

ENVIRONMENTAL EFFECTS SUMMARY

TABLE II–2 - SUMMARY OF ENVIRONMENTAL EFFECTS contains a summary of the information found in *CHAPTER III – EXISTING ENVIRONMENT AND ENVIRONMENTAL EFFECTS.* This table displays information on the environmental effects of the Shorts Meadow/Evers Creek Timber Sale Project area and the entire Stillwater State Forest as it relates to the issues associated with the project proposal. The current, or existing, condition can be viewed as a baseline condition, which can be used to compare the predicted changes with the selection of either alternative. For more in-depth discussions of the individual resources, see *CHAPTER III – EXISTING ENVIRONMENT AND*

RESOURCE	DIRECT AND INDIRECT EFFECTS	CUMULATIVE EFFECTS
VEGETATION		
Covertype	***No-Action Alternative***	
	No changes would be expected.	Other timber sale forest-management actions would increase the amount of western white pine and western larch/ Douglas-fir covertypes by reducing mixed-conifer, subalpine fir, and lodgepole pine covertypes.
	Action Alternative	
	Approximately 171 acres of the mixed-conifer covertype and 23 acres of the lodgepole pine covertype would be converted to a western larch/Douglas-fir covertype. Approximately 251 acres of the western larch covertype and 3 acres of the lodgepole pine covertype would remain unchanged.	Cumulative effects would be the same as under the No-Action Alternative.
Age class	***No-Action Alternative***	
	No changes would be expected.	Other forest-management actions would increase the amount of area in the 0-to-39-year age class by decreasing the percent of area from other age classes.
	Action Alternative	
	No changes would be expected.	Cumulative effects would be the same as under the No-Action Alternative.
Insects and diseases	***No-Action Alternative***	
	Infestation, mortality, and loss of sawlog value would continue at current rates.	Increases to insect infestation and disease infection occurrences can be expected as timber stands become more densely stocked, have less vigor, and contain increased levels of blown down timber.

RESOURCE	DIRECT AND INDIRECT EFFECTS	CUMULATIVE EFFECTS
VEGETATION (continued)		
Insects and diseases (continued)	***Action Alternative***	
	The increased vigor of the new regeneration and species being retained for seedtrees, primarily western larch and ponderosa pine, would improve long-term resistance to insect and disease problems. Trees that are highly susceptible to root rot would be harvested, recovering potential loss in value.	The condition in the postharvest timber stands would be less conducive to mortality and loss of value from insect and disease attacks given that the proposed action would reduce stocking density, increase vigor, and remove concentrations of blowdown.
Noxious weeds	***No-Action Alternative***	
	Recreationalists using the project area would continue to introduce and spread weed seeds. No revenue would be collected to fund the noxious-weed program.	Roads in the project area would continue to have dispersed traffic from recreation and timber-management activities, thus increasing exposure to weed establishment. If funding remains available through the weed-management program, some of the large populations in the analysis area would be treated.
	Action Alternative	
	Additional motorized vehicle traffic would occur and mineral soil would be exposed. Mitigation measures have been designed for the project to minimize effects. Behind road closures, sale roads would be sprayed before roadwork begins and during the sale.	Cumulative effects would be the same as under the No-Action Alternative.
Forest fuels	***No-Action Alternative***	
	No direct effects would take place under this alternative. Fuel loads and distribution would increase, as would the risk of stand-replacement wildfires and associated fire suppression costs.	Forest succession and stand development would continue as determined by site conditions, weather, timber management, and those factors described under *EXISTING CONDITIONS.*
	Action Alternative	
	The existing overstory would be thinned, ladder fuels would be reduced, and a large percentage of species that would be susceptible to mortality from wildfires would be removed. Created openings would help wildfire suppression efforts.	Cumulative effects would be the same as under the No-Action Alternative.

RESOURCE	DIRECT AND INDIRECT EFFECTS	CUMULATIVE EFFECTS
HYDROLOGY		
Sediment delivery	***No-Action Alternative***	
	No direct effects. Indirect effects would be an increased risk of sediment delivery to streams from crossings that do no meet applicable BMPs.	All existing sources of sediment would continue to recover or degrade as dictated by natural and preexisting conditions until funding became available for repair.
	Action Alternative	
	Erosion control and BMPs would be improved on approximately 6 miles of existing road. The risk of sediment delivery to streams would be very low as a result of the proposed timber-harvesting activities.	Over the long term, with the installation of more effective surface drainage and erosion-control features on the existing road system, cumulative sediment delivery to streams in the project area would be lower than existing conditions.
Water yield	***No-Action Alternative***	
	No direct effects would take place.	Cumulative effects on water yield would include an increase in annual water yield to 8.6 percent in the Evers Creek and 9.6 percent in Johnson Creek watersheds as a result of ongoing timber management on FNF lands within the project area watersheds. Existing harvest units would continue to revegetate and move closer to the premanagement levels of water use and snowpack distribution.
	Action Alternative	
	The annual water yield would increase by an estimated 1.4 percent in the Evers Creek watershed and 1.5 percent in the Johnson Creek watershed. These levels of water yield increases would not be sufficient to create unstable stream channels.	The removal of trees, combined with ongoing forest management on FNF land, would increase the water yield in the Evers Creek watershed from its current level of approximately 6.2 percent over unharvested to an estimated 10.1 percent, and the Johnson Creek watershed from its current level of approximately 8.5 percent over unharvested to an estimated 11.1 percent. A low risk of adverse cumulative impacts to water quality would occur as a result of this alternative.

RESOURCE	DIRECT AND INDIRECT EFFECTS	CUMULATIVE EFFECTS
SOILS		
	No-Action Alternative	
	No direct or indirect effects to the physical properties of soils in the project area would be expected. No ground-based activities would take place, which would leave the soil resources in the project area unchanged from the description in the *EXISTING CONDITIONS* portion of this analysis.	No effects would be expected.
	Action Alternative	
	Based on DNRC soil monitoring, direct impacts would be expected on up to 41 of the total 448 acres proposed for harvesting. Soil monitoring conducted on DNRC lands shows that sites harvested on Stillwater State Forest on similar soils with ground-based machinery had a range of impacts from 4.6 to 9.0 percent of the acres treated (*DNRC, 2004*). As a result, the extent of impacts expected would likely be similar to those reported by *Collins* (*DNRC 2004*), or approximately 4.6 to 9.0 percent of ground-based harvested acres. Potential impacts to soils from cable-yarding units would be less than 10 percent of the area, provided corridors are approximately 75 feet apart and have impacts confined to a 6– to 8-foot width. Approximately 0.25 acre of new road would be constructed with the Active Alternative. This road would generate less than 1.0 acre of additional direct impacts to soil physical properties beyond the harvesting activities.	Approximately 151 acres with previous timber sale operations would be entered. Cumulative effects to soils may occur from repeated entries into a forest stand where additional ground is impacted by equipment operations. Existing skid trails where compaction has begun to ameliorate through freeze-thaw cycles and revegetation would return to a higher level of impact due to this alternative. Additional trials may also be required if existing trails are in undesirable locations. Cumulative impacts to physical properties of soils under this alternative would still fall below the range analyzed for in the *EXPECTED FUTURE CONDITIONS* section of the *SFLMP* and are well within the 20-percent impacted area established as a level of concern in the *SFLUMP (DNRC, 1996)*.
FISHERIES		
	No-Action Alternative	
	No direct or indirect effects would be expected on fish populations or fish habitat in the Evers Creek and Logan Creek watersheds. Direct and indirect effects would be limited to those under current and natural conditions.	The effects of past ground-based operations in the proposed project area have not led to any identified sources of sediment to spawning sites in Evers Creek or the unnamed tributary to Logan Creek.

RESOURCE	DIRECT AND INDIRECT EFFECTS	CUMULATIVE EFFECTS
FISHERIES (continued)		
	Action Alternative	
	Portions of some of the proposed units are located within the SMZs of Evers Creek and an unnamed tributary to Logan Creek above Tally Lake. Some timber harvesting is proposed within the Streamside Management Zone (SMZ) and Riparian Management Zone (RMZ). All proposed timber management within these areas will meet all applicable *SMZ Rules, and would satisfy ARM 36.11.425(5)* and *36.11.425(9)*. As a result, a low risk of adverse effects is expected to stream shading, stream temperature, and large woody debris recruitment in Evers Creek and the unnamed tributary to Logan Creek.	The effects of past ground-based operations in the proposed project area have not led to any identified sources of sediment to spawning sites in the Evers Creek watershed and the unnamed tributary to Logan Creek watershed. The inclusion of the direct and indirect effects expected from the action alternative and Logan Creek Ecosystem Restoration Project would have a low risk of changing this. As a result, the proposed action alternative would have low risk of adverse cumulative impacts on fisheries populations in the Evers Creek watershed, the unnamed tributary to Logan Creek, or downstream waters.
AESTHETICS		
	No-Action Alternative	
	Excluding natural events, views would not change in the project area in the near future.	A wildfire occurring in this area may be intensive and extensive, changing views over a large area quickly. Timber harvesting on adjacent sections would likely continue, providing a more distinct view into State land.
	Action Alternative	
	Damage to vegetation and disturbances to soil would have short-term effects with applied mitigations. Viewing distances into harvest units would be increased due to the reduction in tree densities.	Cumulative effects would be the same as under the No-Action Alternative.
ECONOMICS		
	No-Action Alternative	
	Trust revenue from the project area would not be realized at this time. A considerable amount of timber would deteriorate beyond commercial value for forest products if no harvesting takes place in the near future.	No change to the area's economy would be expected provided a local mill purchases a substituted amount of timber. Lack of a viable substitution could result in a negative effect to DNRC's annual cash flow.

RESOURCE	DIRECT AND INDIRECT EFFECTS	CUMULATIVE EFFECTS
ECONOMICS (continued)		
	Action Alternative	
	An estimated $623,955 in project revenue would be deposited into school trust accounts and approximately $57,525 into the FI account. Approximately $8,523 of road improvements would be accomplished. Cost for site preparation and reforestation would be reinvested in the harvest units from the FI account (approximately $126 per acre for a total of $57,525).	If implemented, a local mill would likely purchase this timber sale and the local economy would benefit from the availability of the sold stumpage.
WILDLIFE		
Snags and coarse woody debris	***No-Action Alternative***	
	No direct changes would be expected in the deadwood resources. Snags would continue to provide wildlife habitats and new snags would be recruited as trees die. Continued decay and decline in the existing snags and trees would continue to contribute to the coarse woody debris in the project area.	Snags and snag recruits have been retained with recent harvesting across Stillwater State Forest. Wildlife relying on snags and coarse woody debris would be expected to persist across the analysis area.
	Action Alternative	
	Timber harvesting could reduce present and future deadwood material. Several snags and snag recruits would be planned for retention within the proposed units. Future snag quality would be enhanced with silvicultural prescriptions that should lead to the reestablishment of shade-intolerant species. The proposed harvesting would reduce structure available for species that use deadwood, especially those species that use medium to small snag structures.	The loss of snags and coarse woody debris associated with this alternative would be additive to the loss associated with past harvesting and any firewood gathering occurring in the analysis area. Wildlife relying on snags and coarse woody debris are expected to persist across the analysis area.
Gray wolf	***No-Action Alternative***	
	Disturbance to wolves would not increase.	

RESOURCE	DIRECT AND INDIRECT EFFECTS	CUMULATIVE EFFECTS
WILDLIFE (continued		
Gray wolf (continued)	***Action Alternative***	
	The project design and contract stipulations are expected to minimize the effects that this project would have on wolves by limiting sight distances and not increasing motorized access. Since these activities occur away from den and rendezvous sites, negligible effects to wolves would be expected.	In addition to this project, activities associated with private residences and harvests under the Logan Creek Ecosystem Restoration Project provide additional mortality risk and reduction of visual screening. The human disturbance and habitat alteration associated with these activities could result in habitat shifts away from adjacent habitats. Since these activities occur away from den and rendezvous sites, negligible effects to wolves would be expected.
Canada lynx	***No-Action Alternative***	
	No lynx habitat would be affected.	
	Action Alternative	
	Harvesting is proposed on 409 acres of *Denning* and *Other Habitat*. A 10-acre harvest unit located along the northwestern edge of the project area was dropped from this alternative to retain a minimum of 5 acres of denning habitat, thereby complying with *ARM 36.11.436(8)[a]*. Since the project area is likely marginal lynx habitat, the short-term reduction in available habitat and the longer term potential increase in foraging habitat would likely have negligible effects to lynx.	In addition to the direct and indirect effects, the USFS Logan Creek Ecosystem Restoration Project analyzed lynx habitat and the impacts of the proposed activities in the Evers Reid LAU to find that denning and forage habitats were adequate for the LAU (*USDA USFS, 2004*). The USFS analysis did not consider most stands in the project area as lynx habitat because these lands lie below 4,100 feet in elevation. The USFS analysis included 46 acres in Section 24 as lynx habitat; however, these acres are not proposed for harvesting under the Shorts Meadow Timber Sale Project. Therefore, since adequate habitat is available for lynx in the USFS-defined LAU and the proposed harvest units were not considered as lynx habitat in that analysis, the changes discussed above would not reduce the analysis area’s ability to support lynx.

RESOURCE	DIRECT AND INDIRECT EFFECTS	CUMULATIVE EFFECTS
WILDLIFE (continued		
Grizzly bear	***No-Action Alternative***	
	No direct effects to grizzly bears would be expected.	Timber harvesting would occur on adjacent USFS lands under the Logan Creek Ecosystem Restoration Project. Proposed activities on Plum Creek timberlands are unknown. Hunting and other nonmotorized activities would occur away from the open roads in the analysis area. Since grizzly bear use in the area is likely low and transitory, the cumulative effects of these activities would likely have negligible effect on grizzly bears using the area.
	Action Alternative	
	Harvesting activities and log hauling during the nondenning period would cause high levels of disturbance that would likely discourage bear use in the project area. If harvesting and hauling occur during the denning season, no disturbance would occur. The visual screening called for in the project design would retain security at key feeding sites and along open roads. Bear use of the area appears to be low; therefore, any effects resulting from this project are expected to be negligible.	Timber harvesting would occur on adjacent USFS land under the Logan Creek Ecosystem Restoration Project. Proposed activities on Plum Creek timberlands are unknown. Hunting and other nonmotorized activities would occur away from the open roads in the analysis area. Since bear use in the area is likely low and transitory, the cumulative effects of these activities would likely have a negligible effect on grizzly bears using the area.
Fisher	***No-Action Alternative***	
	No fisher habitat would be harvested. Over time, fisher habitat would increase as stands continue to age and deadwood increases.	Timber harvesting is planned for adjacent sections of USFS lands. Approximately 36 acres of additional habitat would be removed from the analysis area and habitat quality could be reduced on another 120 acres. Taken cumulatively, fisher habitat and movement corridors would be retained throughout the project area and on adjacent lands. Negligible effects are expected under both alternatives; however, less effect would occur with the No-Action Alternative.

RESOURCE	DIRECT AND INDIRECT EFFECTS	CUMULATIVE EFFECTS
WILDLIFE (continued		
Fisher (continued)	***Action Alternative***	
	This alternative proposes to harvest 301 acres of upland and 11 acres of riparian fisher habitat. Although fisher habitat would be removed or decreased in quality, 485 acres (60.7 percent) of upland and 35 acres (76.1 percent) of riparian fisher habitat would be retained in the project area. These acres could continue to provide some habitat and movement corridors. As other stands continue to age, fisher habitat could be increased. Therefore, negligible effects to fishers are expected with this alternative.	Timber harvesting is planned for adjacent sections of USFS land. Approximately 36 acres of additional habitat would be removed from the analysis area and habitat quality could be reduced on another 120 acres. Taken cumulatively, fisher habitat and movement corridors would be retained throughout the project area and on adjacent lands. Negligible effects are expected.
Pileated woodpecker	***No-Action Alternative***	
	The amount and quality of pileated woodpecker habitat would remain unchanged in the project area in the short term. In the longer term, current timber stands would likely produce larger trees and snags that could increase the amount of habitat available for pileated woodpecker use.	Timber harvesting on USFS land under the Logan Creek Ecosystem Restoration Project would affect 225 acres. After this project is completed, 1,451 acres, or 15.1 percent of the analysis area, would remain as potential woodpecker habitat. Additionally, firewood harvesting would continue to remove snags and down wood, especially near open roads. The removal of deadwood reduces feeding and potential nesting structure for pileated woodpeckers. The quantity and quality of pileated woodpecker habitat would remain low, resulting in continued limited habitat for this species.

RESOURCE	DIRECT AND INDIRECT EFFECTS	CUMULATIVE EFFECTS
WILDLIFE (continued		
Pileated woodpecker (continued)	***Action Alternative***	
	Timber harvesting would reduce canopy cover on 76 acres (38 percent of existing habitats on DNRC-managed lands, or 4.5 percent of habitats in the cumulative-effects analysis area) of pileated woodpecker habitats. Pileated woodpecker habitat could be reduced in the short term, but structure and preferred tree species would be retained. Where 40 percent or more canopy cover is retained, pileated woodpeckers use could continue to some degree in the short term, with use increasing as the retained tree canopy closes in the future.	The reduction in pileated woodpecker habitats on 76 acres of DNRC-managed lands would be additive to the 225 acres of habitat reductions planned for in the Logan Creek Ecosystem Restoration Project. After these projects are completed, 1,375 acres, or 14.3 percent of the analysis area, would remain as potential woodpecker habitat. Additionally, firewood harvesting would continue to remove snags and down wood, especially near open roads. The removal of deadwood reduces feeding and potential nesting structure for pileated woodpeckers. Overall, the quantity and quality of pileated woodpecker habitat would continue to be limited, resulting in continued limited habitat for this species.
WILDLIFE - BIG GAME SPECIES		
White-tail deer	***No-Action Alternative***	
	The habitat conditions and movement corridors would remain intact, resulting in no change in habitat use or migration paths through the project area.	Timber harvesting is occurring on USFS lands adjacent to the project area. These harvests could reduce the amount of cover in the area, but would not prevent big game travel through the project area or adjacent lands.
	Action Alternative	
	Approximately 448 acres of forested habitats would be harvested. The location of these units provide areas of forested or hiding cover interspersed throughout the project area, which an animal could use to successfully move through the project area.	In addition to the effects discussed in direct and indirect effects, timber harvesting is occurring on USFS lands adjacent to the project area. These harvests could reduce the amount of cover in the area, but would not combine with this alternative to prevent big game travel through the project area or adjacent lands.

RESOURCE	DIRECT AND INDIRECT EFFECTS	CUMULATIVE EFFECTS
WILDLIFE - BIG GAME SPECIES (continued)		
Big game security	***No-Action Alternative***	
	No changes to big game vulnerability would occur.	Timber is currently being harvested on USFS lands, which would reduce vegetation that provides hiding cover. These reductions could result in habitat shifts, but are unlikely to affect ungulate population levels.
	Action Alternative	
	No changes in elk security cover would be expected since security cover does not exist completely within the project area.	Timber is currently being harvested on USFS lands. These harvests would add to the effects of the Action Alternative by further reducing vegetation that would provide hiding cover. These reductions could result in habitat shifts, but are unlikely to affect ungulate population levels.

CHAPTER III
EXISTING ENVIRONMENT AND ENVIRONMENTAL CONSEQUENCES

INTRODUCTION

This chapter describes both the existing environment and environmental effects relevant to the resource issues defined in *CHAPTER I-PUROSE AND NEED* and is arranged in the same order.

The following information, presented by issue category, presents both the existing conditions, or the affected environment, and the potential environmental effects on the resource as the result of implementing either the No-Action Alternative or Action Alternative. The description of the affected environment, in part, serves as a baseline to compare changes resulting from the Action Alternative.

VEGETATION AND TIMBER STAND ANALYSIS

INTRODUCTION

This analysis provides a detailed description of the conditions of the forest in the analysis area and addresses the potential effects of the proposed alternatives related to the following issues:

- forest covertypes
- age class distributions
- insects and diseases
- forest fuels
- noxious weeds

ANALYSIS METHODS

BACKGROUND

The Forest Management Rules direct DNRC to take a coarse-filter approach to biodiversity by favoring an appropriate mix of stand structures and tree-species composition; this appropriate mix is described as the desired future conditions on State land (*DNRC 2003*). To implement a coarse-filter approach and meet the directive, landscape-analysis techniques were used to determine desired future conditions and forest covertype representation, as well as age-class distribution and structural characteristics.

METHODS

Landscape-Level Analysis

Information from the timber stand inventory in the 1930s was used in the *Lozensky 1993* data to estimate the proportion of various stages of structure by covertype as they were historically represented throughout the Inland Northwest. This provides an estimate of the natural characteristics of forests prior to fire suppression and active timber management.

The *Stillwater Stand Level Inventory (SLI)*, specifically *STW SLI_2006*, was used to assign current covertypes. Areas displaying DNRC's desired future conditions have been delineated in the Forest Management Bureau's *DFC DATASET* and are based on ecological characteristics, such as landtypes, climatic sections, habitat types, and disturbance regimes, found in the SLI data. This information is available at the Stillwater Unit office in Olney.

Historic age-class distributions were taken from the results of *Lozensky's* analysis on the Upper Flathead Valley (*Lozensky 1997).*

Project-Level Analysis

To assess the existing condition of the project area and surrounding landscape, a variety of techniques were used. Field visits, scientific literature, *SLI* data, and consultations with other professionals provided information for the analysis. The existing condition and effects assessments for insects, diseases, noxious weeds, and forest fuels consider:

- forest covertypes,
- tree species and size classes,
- fire regimes, and
- risks associated with fire and further insect infestations and disease infections, and
- potential changes to noxious weed populations.

ANALYSIS AREA

The coarse-filter analysis will consider historic conditions from Climatic Section 333c, which represents the Upper Flathead Valley (*Lozensky 1997*). The current and desired future forest conditions will be analyzed on forested lands administered by Stillwater Unit. Stillwater Unit administers Stillwater State Forest, Coal Creek State Forest, and scattered lands in northeastern Flathead and Lincoln counties.

Assessments of insects, diseases, fuel, noxious weed conditions, and aesthetics were conducted on the

1,440 acres within the project area.

COVERTYPES AND AGE CLASSES

EXISITING CONDITION

Covertype refers to the dominant tree species that currently occupy a forested area. *TABLE III-1 – THE CURRENT AND DESIRED FUTURE CONDITIONS OF COVERTYPES ON FORESTED LAND ADMINISTERED BY STILLWATER UNIT (BY PERCENT)* illustrates the current forest covertypes and desired future conditions, which means those covertypes that are appropriate for the site are based on those ecological characteristics described above.

Data indicates, as illustrated by *TABLE III-1 - THE CURRENT AND DESIRED FUTURE CONDITIONS OF COVERTYPES ON FORESTED LAND ADMINISTERED BY STILLWATER UNIT (BY PERCENT)*, that mixed-conifer and subalpine fir stands are currently overrepresented in reference to conditions that DNRC feels appropriate for the site. The appropriate covertype distribution is based on the current percent of species mix, fire and fire-suppression history, western white pine blister rust mortality, harvest history, and local site conditions. Many of the species that make up the mixed-conifer and subalpine covertypes are shade tolerant, and stand structure tends to be multistoried. The multistoried structure has resulted, in part, from the ingrowth of the shade-tolerant trees over time. Therefore, the component of shade-tolerant species increases as the interval between disturbances, such as wildfire or harvesting, is lengthened.

The western larch/Douglas-fir and western white pine covertypes are currently underrepresented on the forest in reference to the appropriate covertype distribution. Western larch and western white pine are not shade tolerant and have, historically, been perpetuated through fairly intensive disturbances such as wildfires. These disturbances most often created single- and two-storied stands of primarily western larch and Douglas-fir overstories and western larch, western white pine, and Douglas-fir understories. While western larch is not shade tolerant, past silvicultural treatments have promoted multistoried western larch/ Douglas-fir stands with numerous age classes represented in small groups of trees within larger stands.

TABLE III-1 – THE CURRENT AND DESIRED FUTURE CONDITIONS OF COVERTYPES ON FORESTED LAND ADMINISTERED BY STILLWATER UNIT (BY PERCENT)

COVERTYPE	CURRENT (%)	DESIRED OR APPROPRIATE COVERTYPE (%)
Douglas-fir	3.5	1.4
Subalpine fir	25.6	16.3
Lodgepole pine	10.7	9.9
Ponderosa pine	0.8	1.7
Mixed conifer	26.1	6.5
Western larch/Douglas-fir	24.5	47.4
Western white pine	2.6	14.8
Hardwoods	3.2	3.1
Area that does not have a covertype designated in the *SLI**	4.3	

**A major portion of those stands not inventoried with a covertype are from stands that were involved in the stand-replacement fires of the Moose Fire of 2001; at the time of data collection, 2001 and 2002, these areas were nonstocked. Reconnaissance since the fire and salvage harvest shows that many areas are regenerating to the early successional covertypes of primarily lodgepole pine or western larch/Douglas-fir.*

Additionally, white pine blister rust infection has drastically affected the western white pine covertype. In reality, the number of healthy western white pine that occupy the canopy as overstory dominants have been on the decline for several decades.

Age-class distributions delineate another characteristic important for determining trends on a landscape level. Comparing the entire Stillwater Unit's administrative area with historical data based on the Upper Flathead Valley and *Lozensky (1997)*, *TABLE III-2 – DISTRIBUTION OF AGE CLASSES* shows that Stillwater Unit is low in the 0-to-39-year (seedling/sapling stands) and 100-to-150-year age classes, and high in the 40-to-99-year and greater-than-150-year age classes. As recognized in forest management and by the Forest Management Rules, age-class distributions are not static and are quite dependant upon disturbances, whether natural or implemented by man through silvicultural practices.

A fairly clear picture emerges of the forest conditions when distributions are combined with information on covertypes as displayed in *TABLE III-3-AGE CLASS DISTRIBUTION OF CURRENT COVERTYPES*.

As was noted in *TABLE III-2 – DISTRIBUTION OF AGE CLASSES,* current age-class distributions are predominately in the oldest age class. The stand structure of these older age classes tend to be multistoried; this occurs when a

TABLE III-2 – DISTRIBUTION OF AGE CLASSES

AGE CLASS	HISTORIC PERCENT IN CLIMATIC SECTION M333C	HISTORIC ESTMATES OF PERCENT ON STILLWATER UNIT	CURRENT PERCENT
0-to-39-year	36	22.8	13.6
40-to-99-year	12	17.9	22.8
100-to-150-year	22	24.7	13.8
150+-year	29	32.8	45.8
No age provided in *SLI**			3.9

**A major portion of these stands were partially burned in the Moose Fire of 2001; SLI updates in 2001 and 2002 could not discern which age class to assign these stands.*

TABLE III-3 - AGE CLASS DISTRIBUTION OF CURRENT COVERTYPES

CURRENT COVERTYPE	AGE CLASS					
	0-TO-39 YEARS	40-TO-99 YEARS	100-TO-149 YEARS	150 YEARS AND OLDER	NO AGE DATA	TOTAL ACRES
	NUMBER OF ACRES					
Douglas-fir	97	421	576	2,372	666	4,132
Hardwoods	118	123	69	64		374
Lodgepole pine	2,571	8,594	320	407	973	12,865
Mixed conifer	3,335	6,725	4,507	15,885	353	30,805
Ponderosa pine	170	0	525	192		887
Subalpine fir	3,946	6,525	4,116	16,823	304	31,714
Western larch/ Douglas-fir	404	4,269	5,816	16,121	2,242	28,852
Western white pine	360	198	325	2,140		3,023
Nonstocked	5,069					5,069
Total Acres (total %)	16,070 (13.6%)	26,855 (22.8%)	16,254 (13.8%)	54,004 (45.9%)	4,538 (3.9%)	117,721

stand has progressed through time and succession to the point that shade-tolerant species, such as grand fir, Engelmann spruce, and subalpine fir are replacing a shade-intolerant overstory, such as western larch. Currently, 94 percent of the area within the 150-year-plus age class is multistoried, and the amount depicted in the mixed-conifer and subalpine fir covertypes is nearly 5 times higher than the desired future condition on Stillwater Unit.

ALTERNATIVE EFFECTS TO COVERTYPES AND AGE CLASSES

Direct and Indirect Effects

- ***Direct and Indirect Effects of the No-Action Alternative to Covertypes and Age Classes***

 Neither covertypes nor age-class distributions in the analysis area would be directly or indirectly affected. Over time, lacking substantial disturbances such as timber harvests or wildfires, the proportion of seedling-/sapling-sized stands would gradually decrease.

- ***Direct and Indirect Effects of the Action Alternative to Covertypes and Age Classes***

 In the area where treatment is proposed in the lodgepole pine covertype, approximately 23 acres would be converted to a western larch/Douglas-fir covertype and 3 acres of the lodgepole pine covertype would remain the same. Approximately 171 acres of the mixed-conifer covertype would be converted to a western larch/ Douglas–fir covertype. Approximately 251 acres of the western larch/Douglas-fir covertype would remain the same. Harvesting would move the representation of covertypes toward desired future conditions.

 Based on SLI methodologies, when the sawtimber component of a stand has greater than 10-percent canopy coverage, the stand will be evaluated and classified with the age class of that sawtimber component; therefore, no seedtree harvest areas would change to the 0-to-39-year age class. Most of these stands receiving harvest treatments are multistoried stands that would be converted to single- or two-storied stands; the overstory of these two-storied stands would consist primarily of older-aged western larch, Douglas-fir, and western white pine; in 2 to 3 years, a second story of western larch, lodgepole pine, western white pine, Douglas-fir, and, in some instances, ponderosa pine would regenerate. The created openings would be typical of mixed-severity fires. The proposed action would mimic the effects of historic fire behavior, creating openings for wildlife, reducing the potential of high intensity wildfires, and regenerating stands toward desired future conditions.

Cumulative Effects

- ***Cumulative Effects of Both Alternatives to Covertypes and Age Classes***

 The cumulative effects of timber-stand management on Stillwater State Forest trend toward increasing seral covertypes in areas where recent forest-management activities have taken place.

 In addition to the changes in covertype distributions from the proposed alternative, the stands involved in the stand-replacement fires of the 2001 Moose Fire have not been inventoried. Other timber sale projects have been initiated, but have not been completed; therefore, their effects are not represented in the *STW 2006 SLI*. These projects would probably increase the amount of western larch/Douglas-fir covertype over the analysis area and, subsequently, reduce the amount of area in the mixed-conifer and subalpine fir covertypes. The Stillwater State Forest precommercial thinning

program thins 200 to 500 acres of sapling stands a year. The thinnings often favor the retention of western larch, western white pine, and, in some cases, Douglas-fir covertypes.

In addition to the changes in age-class distributions from the proposed alternative, other timber sale projects have been initiated, but have not been completed; therefore, their effects are not represented in the *STW 2006 SLI.* These projects are estimated to increase the amount of area in the 0-to-39-year age class by slightly decreasing the area in older stand classes.

INSECTS AND DISEASES

EXISTING CONDITIONS

The Shorts Meadow/Evers Creek Timber Sale Project area is showing an increase in the incidence of western balsam bark beetles, Douglas-fir beetles, mountain pine beetles, and spruce bark beetles. The spruce bark beetle infestations are incidental in the Engelmann spruce stands along Evers Creek. Blowdown and subsequent spruce bark beetle infestations have occurred over the past 15 years. Based on species, tree age, size class, and the potential for continued disturbances such as blow-down events, proposed Units 3A and 5 meet the classification of high risk for continued spruce bark beetle infestations. The present tree mortality and fuel-loading conditions in Units 1a, 1b, and 1c are the result of mountain pine beetle infestations.

Armillaria and brown cubicle root rots are affecting Douglas-fir, subalpine fir, grand fir, and Engelmann spruce in the project area. Douglas-fir shows most evidence of root rot in Units 10 and 13.

ALTERNATIVE EFFECTS TO INSECTS AND DISEASES

Direct and Indirect Effects

- ***Direct and Indirect Effects of the No-Action Alternative to Insects and Diseases***

 Insect populations would continue to rise or fall based on natural disturbances or climatic conditions. The potential for an increase in spruce bark beetle attacks exists if Engelmann spruce were damaged by wind events, stem breakage, or fire in the vicinity of these forested lands. The Douglas-fir bark beetle population and *Armillaria* root rot would also, potentially, increase damage to Douglas-fir.

- ***Direct and Indirect Effects of the Action Alternative to Insects and Diseases***

 Insect populations would continue to rise or fall based on natural disturbance events or climatic conditions. The increased vigor of the new regeneration and species being retained for seedtrees, primarily western larch and ponderosa pine, would improve long-term resistance to insects and diseases.

 Seedtree harvests would reduce the amount of trees susceptible to Douglas-fir bark beetle infestations on approximately 44 acres in Units 10 and 13. The retained species mix would be far less susceptible to *Armillaria* root rot. Regeneration harvests in Units 3A, 5, 6, 9, and 12 would reduce the potential for an outbreak of spruce and western balsam bark beetles in subalpine fir on approximately 170 acres. Mature retention trees along Evers Creek in Units 3A and 5 may blow down and maintain a small beetle population for several years.

Cumulative Effects

- ***Cumulative Effects of the No-Action Alternative to Insects and Diseases***

 The current trend in mortality, infection, and infestation levels in mature stands would continue. Increases in insect infestation and disease infection occurrences can be expected as timber stands become more densely stocked, lower in vigor, and contain increased levels of blown down timber. From the project level scale, if the current timber stand condition trends cause bark beetle outbreaks, mortality over much of the project area may occur and loss of value due to stem decay would likely increase.

- ***Cumulative Effects of the Action Alternative to Insects and Diseases***

 The condition in the timber stands after harvesting would be less conductive to mortality and loss of value from insect and disease attacks given that the proposed action would reduce stocking density and increase vigor.

 Western larch regeneration has been promoted and managed for the long-term, thereby improving resistance to insect and disease problems on those areas being harvested.

FOREST FUELS

Past timber management, fire suppression, and subsequent stand development have influenced the amount and distribution of fuels on these various stands in the project area. Stands in these sections have developed a high number of stems per acre and several levels of canopy. A fire in forests under these conditions can reach the upper canopy levels through the available ladder fuels, causing torching and, under some conditions, resulting in crown fires.

On the units harvested in the Shorts Meadow/Evers Creek area in 1996 and 1997, ladder fuels were reduced, approximately 15 tons of large woody debris per acre was retained on site to facilitate nutrient cycling for the soils, and the Montana Hazard Reduction Law standards were met.

FIRE GROUPS

On State ownership in the Shorts Meadow/Evers Creek area, stand-replacement fires occurred around 1680, 1740, and 1907. Understory fires took place around 1830 and 1885. Since 1981, 2 lightning-caused fires have been contained to 0.1 acre (*Stillwater Fire-Occurrence Records*).

The habitat types for stands in the Shorts Meadow/Evers Creek sections are primarily moist or warm and dry grand fir types and moist subalpine fir types, with a small percentage of Douglas-fir habitat types (*Fisher*). Under natural conditions, the drier sites had more frequent fires than the moister sites, where the understory was usually green enough to limit rapid fire spread unless severe conditions persisted.

Following the habitat-type grouping that was done by *Fisher and Bradley*, *Fire Ecology of Western Montana Habitat Types*, the Shorts Meadow/ Evers Creek area is represented by 4 fire regimes, which are classified as fire groups:

- Fire Group 11 (46 percent),
- Fire Group 9 (28 percent),
- Fire Group 8 (20 percent), and
- Fire Group 6 (6 percent).

Fire Group 11 covers a wide variety of site and moisture differences, and fire severity can range from minor ground fires on moist sites to stand-replacing fires. Down, dead fuel loads average about 25 tons per acre. Heavy fuel loads combined with drought conditions set the stage for severe, widespread fires in this group.

Fire Group 9 represents moist, lower subalpine habitat types where fires are infrequent, but severe, and the effects are long lasting. Under normal moisture conditions, the lush

undergrowth usually serves as an effective barrier to rapid fire spread for this group. When drought conditions exist, a severe surface fire will have a good chance of killing the trees.

Fire Group 8 Group consists of dry lower subalpine habitat types. Stands in this group are characterized by relatively large amounts of down woody fuel of all size classes (20 to 80 tons per acre). Live fuels in this fire group can contribute significantly to overall fire hazards during dry conditions. This group is characterized by deep duff layers that can cause significant tree mortality during a fire. The burning duff will heat and kill the cambium layer on the shallow roots of subalpine fir and Engelmann spruce, thereby causing tree mortality.

Fire Group 6 covers fire intensities from nonlethal to mixed lethal, with small areas of stand-replacing fires. Of the fire groups that occupy the area, this regime has the lowest amount of down dead fuel loads, averaging 12 tons per acre.

ALTERNATIVE EFFECTS TO FOREST FUELS

Direct and Indirect Effects

- ***Direct and Indirect Effects of the No-Action Alternative to Forest Fuels***

 Stands would continue to retain ladder fuels and dense stands until a disturbance, man-caused or natural, occurs. Risk of torching and crown fires would remain high. As the trees in the more recently harvested areas grow, ladder fuels would increase.

- ***Direct and Indirect Effects of the Action Alternative to Forest Fuels***

 Areas utilizing a seedtree harvest treatment would retain approximately 10 to 15 tons per acre of large woody debris following site-preparation treatments. Fire is always a potential, but the ladder fuels to crowns would be removed in the proposed harvest units, and fuel treatments would limit the fire intensity under most circumstances. The success of aerial and ground attacks on wildfires would likely be improved because any fire occurring would most likely be a ground fire burning in the understories rather than a stand-replacing crown fire.

 Areas utilizing a commercial-thin harvest treatment would reduce the amount of trees and, thereby, reduce fuel loads. The connectivity of fuel and ladder fuels may not be reduced. In some circumstances, the risk of wildfires may be increased due to an increased amount of wind, dry fuels on the forest floor, and ladder fuels that have not been significantly reduced.

 A broadcast burn would be conducted in Units 10 and 13 in the spring to provide the coolest burn possible and reduce the chance of damage to merchantable trees. The burn would reduce the amount of common juniper and logging slash on the area and help prepare the seedbed for natural regeneration and the planting of ponderosa pine seedlings. Slash left in the woods would meet the State Hazard Reduction Laws. Slash piles left at landings would be burned or otherwise disposed of within 2 years of their creation.

 The proposed harvesting would also decrease the risk of uncontrollable fires to adjacent land and homesites. The thinning and removal of forest fuels, especially in the canopies, would be expected to decrease fire intensities, allowing fire personnel to control these fires more easily.

Cumulative Effects

- ***Cumulative Effects of the No-Action Alternative to Forest Fuels***

 In the past 10 years, approximately 335 acres of the harvest area in the Shorts Meadow/ Evers Creek sections have been treated to lower fuels to a level that meet Montana's Hazard Reduction Law. USFS is currently conducting the Logan Creek Ecosystem Restoration Project in areas near the Shorts Meadow/Evers Creek sections. This action is reducing fuel loading, ladder fuels, and connectivity on approximately 1,600 acres.

- ***Cumulative Effects of the Action Alternative to Forest Fuels***

 In addition to the actions displayed under the *Cumulative Effects of the No-Action Alternative to Forest Fuels*, 448 acres would be harvested and slash and fuel loading would be reduced to meet the Hazard Reduction Law; in many areas of the wildland urban interface, slash reduction would meet the *High Standards* set forth in the Hazard Reduction Law.

 Due to the location of the proposed harvest units and the reduction of fuel loads and amount of canopy, the success of aerial and ground attacks on wildfire would likely be improved.

NOXIOUS WEEDS

EXISTING CONDITIONS

Noxious weeds, such as spotted knapweed (*Centaurea maculosa*), orange hawkweed (*Hieracium aurantiacum*), tansy ragwort (*Senecio jacobaea*), St. John's-wort (*Hypericum perforatum*), and oxeye daisy (*Chrysanthemum leucanthemum*), have established populations on all sections in the project area. Populations are primarily located in areas near or on roadways; the amount of noxious weeds under the forest canopy are very limited. Currently, limited weed spraying is done along most county roads accessing the project area.

ALTERNATIVE EFFECTS

Direct and Indirect Effects

- ***Direct and Indirect Effects of the No-Action Alternative to Noxious Weeds***

 Populations would most likely continue to increase on segments of roads open to motorized use and would least likely increase on those areas restricted to motorized use.

 This alternative would not collect funds for noxious-weed management, which would reduce the ability of DNRC to treat noxious weeds in this area.

- ***Direct and Indirect Effects of the Action Alternative to Noxious Weeds***

 New infestations and existing populations are likely to increase with disturbances as road-construction, harvesting, and site-preparation equipment expose mineral soil. Grass seeding soon after soil disturbances take place would reduce the likelihood of new or increased infestations. The requirement that off-road equipment is thoroughly washed and inspected for weed seed would reduce the likelihood of spotted knapweed, oxeye daisy, and orange hawkweed infestations spreading into the forest. Spraying for weeds on the closed roads would be included in the timber sale contract(s) if the action alternative is chosen.

Cumulative Effects

- ***Cumulative Effects of Both Alternatives to Noxious Weeds***

 The open roads in the project area have traffic from dispersed recreation, timber-management activities, and other uses on a regular basis. Illegal motorized vehicles off-road and behind road closures increase exposure to weed establishment. Over time, the weed-management program at Stillwater Unit, including

cooperation with the USFS and Flathead County Weed Department, has increased the amount of areas being sprayed. If funding remains available, some of the large populations of weeds in the analysis area would be treated to reduce or limit increases in weed populations.

WATERSHED AND HYDROLOGY ANALYSIS

INTRODUCTION

SEDIMENT DELIVERY

Timber harvesting and related activities, such as road construction, can lead to water-quality impacts by increasing the production and delivery of fine sediment to streams. Construction of roads, skid trails, and landings can generate and transfer substantial amounts of sediment through the removal of vegetation and exposure of bare soil. In addition, removal of vegetation near stream channels reduces the sediment-filtering capacity and may reduce channel stability and the amounts of large woody material. Large woody debris is a very important component of stream dynamics, creating natural sediment traps and energy dissipaters to reduce the velocity and erosiveness of stream flows.

WATER YIELD

Timber harvesting and associated activities can affect the timing, distribution, and amount of water yield in a harvested watershed. Water yields increase proportionately to the percentage of canopy removal because removal of live trees reduces the amount of water transpired, leaving more water available for soil saturation and runoff. Canopy removal also decreases interception of rain and snow and alters snowpack distribution and snowmelt, which lead to further water-yield increases. Higher water yields may lead to increases in peak flows and peak-flow duration, which can result in accelerated streambank erosion and sediment deposition.

ANALYSIS METHODS

SEDIMENT DELIVERY

Methodology for analyzing sediment delivery was completed using a sediment-source inventory. All roads and stream crossings were evaluated to determine existing and potential sources of introduced sediment. In addition, in-channel sources of sediment were identified using channel-stability rating methods developed by *Pfankuch* and through the conversion of stability rating to reach condition by stream type developed by *Rosgen (1990)*. These analyses were conducted in 2006 by a DNRC hydrologist.

WATER YIELD

The water-yield increase for the watershed in the project area was determined using the Equivalent Clearcut Area (ECA) method as outlined in *Forest Hydrology Part II (1976)*. ECA is a function of total area roaded and harvested, percent of crown removal in harvest areas, and amount of vegetative recovery that has occurred in harvest areas. This method equates area harvested and percent of crown removed with an equivalent amount of clearcut area. For example, if 100 acres had 60 percent crown removed, ECA would be approximately 60, or equivalent to a 60-acre clearcut. The relationship between crown removal and ECA is not a 1-to-1 ratio, so the percent ECA is not always the same as the percent of canopy removal. As live trees are removed, the water that would have evaporated and transpired either saturates the soil or is translated to runoff. This method also calculates the recovery of these increases as new trees vegetate the site and move toward preharvest water use.

In order to evaluate the watershed risk of the potential water-yield increase effectively, a threshold of concern must be established. The stability of a stream channel is an important indicator of where a threshold of concern should be set. As water yields increase as a result of canopy removal, the amount of water flowing in a creek gradually increases. When these increases

reach a certain level, the bed and banks may begin to erode. More stable streams will be able to handle larger increases in water yield before they begin to erode, while less stable streams will experience erosion at more moderate water-yield increases.

ANALYSIS AREA

SEDIMENT DELIVERY

The analysis area for sediment delivery is the Shorts Meadow/Evers Creek Timber Sale Project area and the proposed haul routes. The proposed project area is located mostly within the Evers Creek watershed, which is a perennial tributary to Logan Creek below Tally Lake. Portions of the proposed project are also located within an unnamed tributary to Logan Creek above Tally Lake. In this analysis, this watershed is referred to as the Johnson Creek watershed. This stream is intermittent and may contribute surface flow to Logan Creek during some high-flow periods. Analysis will cover stream segments within these watersheds that may be affected by the proposed project and all roads and upland sites that may contribute sediment to Evers Creek or Logan Creek.

WATER YIELD

The analysis area for water yield is the Evers Creek and Johnson Creek watersheds. The Evers Creek watershed covers 7,769 acres. The Johnson Creek watershed covers 3,321 acres. No portion of the proposed project is located in Johnson Creek, but in an unnamed intermittent watershed in Logan Creek that includes Johnson Creek. Precipitation in the project area watersheds ranges from 20 inches at the confluence with Logan Creek to 40 inches at the ridge tops.

EXISTING CONDITIONS

REGULATORY FRAMEWORK

- **Montana Surface Water Quality Standards**

 According to *ARM 17.30.608 (1)(c)*, this portion of the Stillwater River drainage, including the Logan Creek and Evers Creek watersheds, is classified as B-1. Among other criteria for B-1 waters, no increases are allowed above naturally occurring levels of sediment, and minimal increases over natural turbidity. "Naturally occurring," as defined by *ARM 17.30.602 (17)*, includes conditions or materials present during runoff from developed land where all reasonable land, soil, and water conservation practices (commonly called BMPs) have been applied. Reasonable practices include methods, measures, or practices that protect present and reasonably anticipated beneficial uses. These practices include, but are not limited to, structural and nonstructural controls and operation and maintenance procedures. Appropriate practices may be applied before, during, or after completion of potentially impactive activities.

 Designated beneficial water uses within the project area include cold-water fisheries and recreational use in streams and wetlands. Existing water rights in the Evers Creek and Logan Creek watersheds include water for domestic use, stock, lawn and garden, and irrigation.

- **Water Quality Limited Waterbodies**

 Portions of Logan Creek located above Tally Lake are currently listed as a water-quality-limited waterbody in the *2006 303(d)* list. The *303(d)* list is compiled by DEQ as required by *Section 303(d)* of the *Federal Clean Water Act* and the *Environmental Protection Agency (EPA) Water Quality Planning and Management*

Regulations (40 CFR, Part 130). Under these laws, DEQ is required to identify waterbodies that do not fully meet water-quality standards or where beneficial uses are threatened or impaired. These waterbodies are then characterized as "water quality limited" and thus targeted for Total Maximum Daily Load (TMDL) development. The TMDL process is used to determine the total allowable amount of pollutants in a waterbody of watershed. Each contributing source is allocated a portion of the allowable limit. These allocations are designed to achieve water-quality standards.

The *Montana Water Quality Act (MCA 75-5-701-705)* also directs the DEQ to assess the quality of State waters, insure that sufficient and credible data exists to support a *303(d)* listing, and develop TMDL for those waters identified as threatened or impaired. Under the Montana TMDL Law, new or expanded nonpoint-source activities affecting a listed waterbody may commence and continue provided they are conducted in accordance with all reasonable land, soil, and water conservation practices. TMDLs have not been completed for Logan Creek. DNRC will comply with the Law and interim guidance developed by DEQ through implementation of all reasonable soil and water conservation practices, including BMPs and Forest Management Rules (*ARM 36.11.401* through *450*).

The current listed causes of impairment in Logan Creek are other flow-regime alterations, physical substrate habitat alterations, and sedimentation/ siltation. The probable sources for Logan Creek are listed as silvicultural activities, streambank modifications/ destabilization, and forest roads (road construction and use).

- **Montana SMZ Law**

 By the definition in *ARM 36.11.312 (3)*, the majority of streams within the project area are class 1 streams. Evers Creek and an unnamed tributary to Logan Creek have flow for more than 6 months each year. Evers Creek supports a population of brook trout and contributes surface flow to Logan Creek below Tally Lake. The unnamed tributary to Logan Creek may contribute surface flow to Logan Creek above Tally Lake during high flow periods. North Fork Evers Creek is a class 2 stream according to *ARM 36.11.312*. This creek flows more than 6 months of the year, but does not contain fish and has reaches that are subsurface and do not contribute surface flow to another body of water.

SEDIMENT DELIVERY

According to field reconnaissance in 1994 and 2006, stream channels in the project area were rated in good condition. Project area streams were rated as C4 and C5 channels by a classification system developed by *Rosgen (1990)*. Channel types rated as "C" are typically in the 1- to 4-percent gradient range and have a high degree of meander (sinuosity). Channel bed materials in C4 and C5 types are mainly gravel and sand. Stream channels in the project area were found to be very stable with very little movement of bed materials. Channel-bottom materials are covered with moss, and no areas of down-cut channels were identified during field reconnaissance. Large woody debris was found in adequate supply. Little evidence of past streamside harvesting was found, and where there had been past logging in the riparian area, there appeared to be no deficiency of existing or potential downed woody material in the streams.

The existing road system in and leading to the proposed project area was reviewed for potential sources

of sediment. The road system in the project area is mainly low to moderate standard, but is not actively contributing sediment to streams. Road surfaces are well vegetated and are not delivering sediment to crossings. Much of the existing road system in the proposed project area meets applicable BMPs. Past project work has installed surface drainage on most of the existing road system, but reaches of the existing road system located away from stream crossings are in need of BMP work to reduce the risk of erosion and sediment delivery.

WATER YIELD

According to *ARM 36.11.423*, allowable water-yield-increase values were set at levels to ensure compliance with all water-quality standards, protect beneficial uses, and exhibit a low to moderate degree of risk. All allowable water-yield increases in watersheds of the project area were set using a low level of risk. This means that the allowable level is a point below where water yields are unlikely to cause any measurable or detectable changes in channel stability. Based on channel-stability evaluations, watershed sensitivity, and acceptable risk, the allowable water-yield increase for the Evers Creek and Johnson Creek watersheds has been set at 12 percent. This water-yield increase would be reached when the ECA level in the Evers Creek watershed reaches the allowable level of 2,331 acres and when the ECA level in the Johnson Creek watershed reaches the allowable level of 996 acres. Timber harvesting and associated road-construction activities have taken place in and around the project area since the 1950s. These activities, combined with vegetative recovery, have led to an estimated water-yield increase of 6.2 percent in the Evers Creek watershed and an estimated 8.5 percent in the Johnson Creek watershed over unharvested conditions. *TABLE III-4 – CURRENT WATER YIELD AND ECA INCREASES IN SHORTS MEADOW/EVERS CREEK WATERSHEDS* summarizes the existing conditions for water yield in the project area watersheds.

TABLE III-4 – CURRENT WATER YIELD AND ECA INCREASES IN SHORTS MEADOW/EVERS CREEK WATERSHEDS

	EVERS CREEK	JOHNSON CREEK
% WYI	6.2	8.5
Allowable % WYI	12	12
Existing ECA	1,178	625
Allowable ECA	2,331	996
Remaining ECA	1,153	371

ALTERNATIVE EFFECTS TO SEDIMENT DELIVERY AND WATER YIELD

DIRECT AND INDIRECT EFFECTS

- ***Direct and Indirect Effects of the No-Action Alternative to Sediment Delivery and Water Yield***

Sediment Delivery

No direct effects to sediment delivery would be expected beyond those currently occurring. Existing sources of sediment, both in channel and out of channel, would continue to recover or degrade based on natural or preexisting conditions.

Indirect effects of this alternative would be an increased risk of erosion and sediment transport from upland road segments that do not meet applicable BMPs. These sites would continue to pose a risk of sediment delivery to streams until other funding became available to repair them.

Water Yield

The No-Action Alternative would have no direct or indirect effects on water yield. Water quality would not change from present levels.

- ***Direct and Indirect Effects of the Action Alternative to Sediment Delivery and Water Yield***

 Sediment Delivery

 Erosion control and BMPs would be improved on approximately 6 miles of existing road. In some cases, the addition of erosion-control measures may increase the risk of sediment delivery in the short term by creating bare soil. However, as these sites revegetate, the long-term risk of sedimentation to a stream would be reduced to levels lower than the existing condition. No stream crossings are proposed for replacement or removal.

 The Action Alternative would have a very low risk of sediment delivery to streams as a result of proposed timber-harvesting activities. Harvesting activities are proposed on approximately 7 acres within designated SMZs. This harvesting activity would retain at least 50 percent of the trees within the SMZs, would follow all requirements of the SMZ Law and *ARM 36.11.425* through *427*, and would have a low risk of affecting recruitment of large woody material to project-area streams. The SMZ law, *ARM 36.11.425* through *427*, and applicable BMPs would be applied to all harvesting activities, which would minimize the risk of sediment delivery to draws and streams.

 Water Yield

 The Action Alternative would increase the annual water yield by an estimated 1.4 percent in the Evers Creek watershed and an estimated 1.5 percent in the Johnson Creek watershed. These levels of water-yield increases would not be sufficient to create unstable channels.

CUMULATIVE EFFECTS

- ***Cumulative Effects of the No-Action Alternative to Sediment Delivery and Water Yield***

 Sediment Delivery

 The cumulative effects on sediment delivery would be very similar to those described in the existing conditions portion of this analysis. All existing sources of sediment would continue to recover or degrade as dictated by natural and preexisting conditions until a source of funding became available to repair them. Sediment loads would remain at or near present levels.

 Water Yield

 Cumulative effects on water yield of the No-Action Alternative would include an increase in annual water yield to an estimated 8.6 percent in Evers Creek and 9.6 percent in Johnson Creek as a result of ongoing timber management on FNF land within project area watersheds. Existing harvest units would continue to revegetate and move closer to premanagement levels of water use and snowpack distribution.

- ***Cumulative Effects of the Action Alternative to Sediment Delivery and Water Yield***

 Sediment Delivery

 Cumulative effects to sediment delivery would be primarily related to roadwork. The installation and improvement of erosion-control and surface-drainage features on existing roads would also affect the cumulative sediment delivery to project-area streams. In the short term, the installation and improvement of surface drainage features would expose bare soil. This would increase the risk of sediment delivery to streams in and around the proposed project area. The application of all applicable BMPs during this work would make increased sediment loads unlikely. Over the long

term, cumulative sediment delivery to project area streams is projected to be lower than existing conditions with the installation of more effective surface-drainage and erosion-control features on the existing road system.

Harvesting of trees within an SMZ would have a low risk of adverse cumulative effects to downed woody material in project-area streams. Tree-retention requirements of the SMZ Law would ensure a future supply of woody material to the creeks.

None of the cumulative impacts described above are expected to adversely affect downstream beneficial uses. All activities would comply with applicable laws, *ARM 36.11.423* and *36.11.425* through *427*.

Water Yield

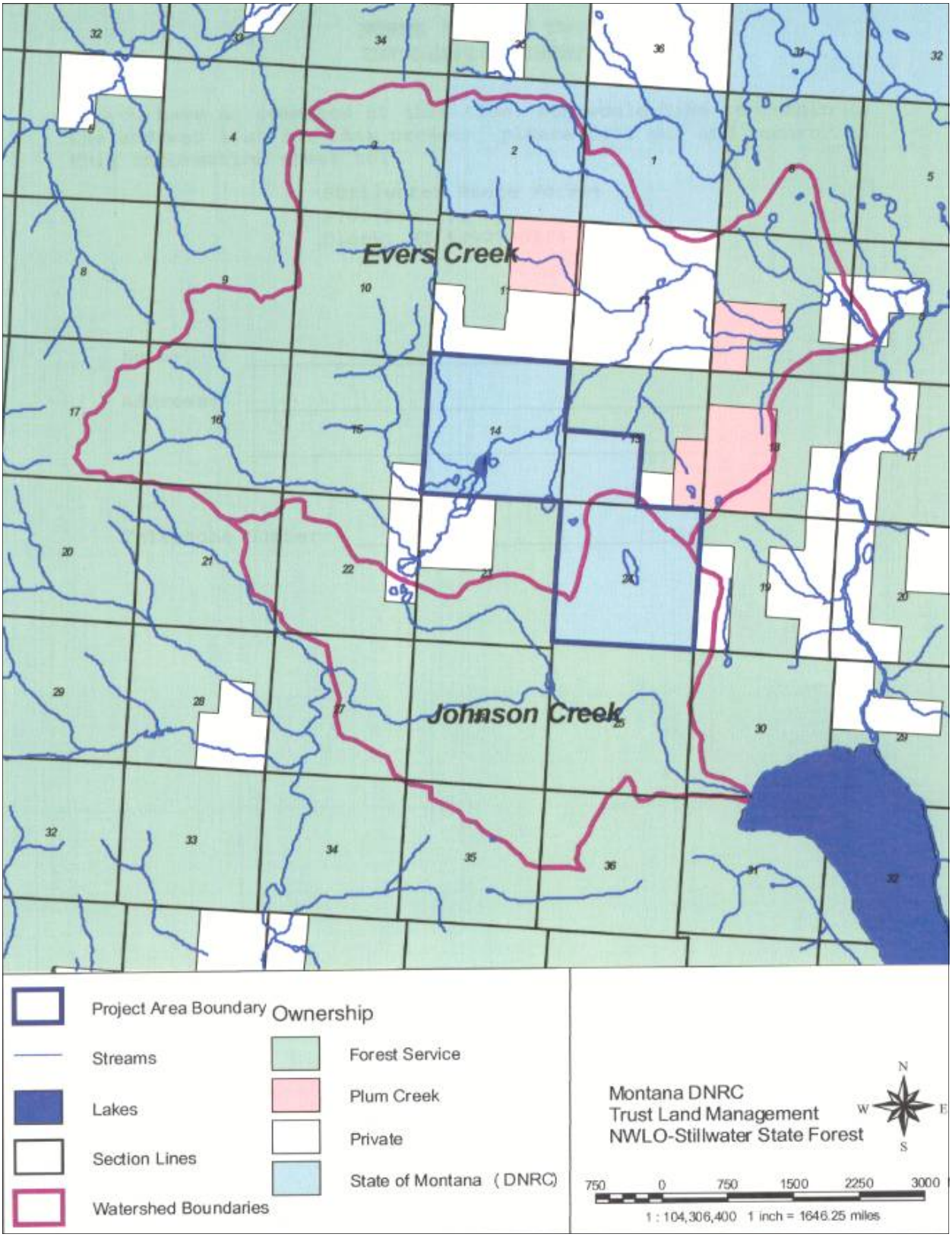
The removal of trees proposed in the Action Alternative, combined with ongoing forest management on FNF, land would increase the water yield in the Evers Creek watershed from its current level of approximately 6.2 percent over unharvested to an estimated 10.1 percent. The removal of trees proposed in the Action Alternative, combined with ongoing forest management on FNF land, would increase water yield in the Johnson Creek watershed from its current level of approximately 8.5 percent over unharvested to an estimated 11.1 percent. These water-yield increases, and the associated ECA levels, include the impacts of all past management activities, existing and proposed roads, proposed and ongoing timber harvesting on other ownerships, and vegetative hydrologic recovery in each watershed. The water-yield increases expected from the Action Alternative leave each project-area watershed well below the established threshold of concern. A low risk of adverse cumulative impacts to water quality could be expected as a result of the Action Alternative. A summary of the anticipated water-yield impacts of the Action Alternative to the project area watersheds is found in *TABLE III-5 – WATER YIELD AND ECA INCREASES IN SHORTS MEADOW/EVERS CREEK WATERSHEDS.*

TABLE III-5 – WATER YIELD AND ECA INCREASES IN SHORTS MEADOW/EVERS CREEK WATERSHEDS

	EVERS CREEK		**JOHNSON CREEK**	
	ALTERNATIVE		**ALTERNATIVE**	
	NO-ACTION[2]	**ACTION[2]**	**NO-ACTION[2]**	**ACTION[2]**
Allowable WYI	12%	12%	12%	12%
% WYI	8.6	10.1	9.6	11.1
Acres harvested[1]	813	1,128	189	316
ECA generated	493	802	90	215
Total ECA	1,671	1,980	715	840
Remaining ECA	660	351	281	156
Allowable ECA	2,331	2,331	996	996

[1]Refers only to acres harvested within the Evers Creek or Johnson Creek watershed.
[2]Values include harvesting activity in progress, but not yet completed on FNF land.

FIGURE III-1—SHORTS MEADOW/EVERS CREEK WATERSHED MAP



SOILS ANALYSIS

INTRODUCTION

LANDFORM DESCRIPTION

The project area lies within a valley formed by glaciers and river processes. The dominant soil types found in the project area are deep glacial tills derived from argillite, siltite, and limestone from the Belt Supergroup. Upper slopes and ridges are weathered bedrock scoured by glaciers.

SOIL PHYSICAL PROPERTIES

This analysis addresses the issue that timber harvesting and associated activities may affect soil conditions in the proposed project area through ground-based activities and repeated entries to previously harvested areas. Operation of ground-based machinery can displace fertile layers of topsoil, which can lead to a decrease in vegetation growth. Ground-based machinery can also lead to compaction of the upper layers of soil. Compaction decreases pore spaces in a soil, reduces its ability to absorb and retain water, and can increase runoff and overland flow. These conditions can also lead to a decrease in vegetation growth.

SLOPE STABILITY

Slope stability can be affected by timber-management activities by removing stabilizing vegetation, concentrating runoff, or increasing soil moisture. The primary risk areas for slope stability problems include, but are not limited to, landtypes that are prone to soil mass movement and soils on steep slopes (generally over 60 percent).

ANALYSIS METHODS

SOIL PHYSICAL PROPERTIES

Impacts to the physical properties of soil will be analyzed by evaluating the current levels of soil disturbance in the proposed project area based on field review and aerial photo review of existing and proposed harvest units. The percent of area affected is determined through pace transects, measurement, aerial photo interpretation, or Geographic Information System (GIS) to determine skid trail spacing and width. From this, skid trail density and percent of area impacted are determined. Estimated effects of proposed activities will be assessed based on findings of DNRC soil monitoring.

SLOPE STABILITY

Slope stability risk factors will be assessed by reviewing the FNF *Land System Inventory* to identify landtypes listed as high risk for mass movement. Field reconnaissance will also be used to identify any slopes greater than 60 percent as an elevated risk for mass movement.

ANALYSIS AREA

The analysis area for evaluating soil productivity will include DNRC-managed land within the Shorts Meadow/Evers Creek Timber Sale Project area. The Evers Creek watershed encompasses most of the project area, with the remainder falling within an unnamed tributary to Logan Creek above Tally Lake.

EXISTING CONDITIONS

SOIL PHYSICAL PROPERTIES

In the Shorts Meadow/Evers Creek Timber Sale Project area, DNRC has conducted timber harvesting since the 1920s. Timber sale records dating back to the 1950s show that approximately 698 acres of timber have been harvested on State land using a combination of ground-based and cable-yarding harvest methods. Ground-based yarding can create soil impacts through displacement and compaction of productive surface layers of soil, mainly on heavily used trails. Based on the field review of previously harvested stands, pacing transects and GIS

analysis of aerial photography show that skid trails are spaced a minimum of 50 feet apart and an average width of disturbed areas is 12 feet. This spacing means that an estimated 15 percent or less of ground-based harvest areas may be impacted by existing trails. Trails are still apparent, but most are well vegetated, and past impacts are beginning to ameliorate from frost and vegetation.

SLOPE STABILITY

Landtypes in the project area vary from nearly level wetlands and stream bottoms to steep valley sideslopes on ridges. The *Flathead National Forest Soil Survey* identified no areas of soils at high risk for mass movements in the project area. No slope failures were identified during reconnaissance in the proposed project area, and slopes are less than 60 percent. Because none of the slope stability risk factors are present in the proposed project area, slope stability will not be evaluated in the remainder of this analysis. A list of landtypes found in the proposed project area, and the associated management implications are found in *TABLE III-7 – SOIL MAP UNIT DESCRIPTIONS FOR THE SHORTS MEADOW/EVERS CREEK TIMBER SALE PROJECT AREA*.

ALTERNATIVE EFFECTS

DIRECT AND INDIRECT EFFECTS

- ***Direct and Indirect Effects of the No-Action Alternative to Soils***

 No direct or indirect effects to the physical properties of soils in the project area would be expected. No ground-based activity would take place, which would leave the soil in the project area unchanged from the description in the *EXISTING CONDITIONS* portion of this analysis.

- ***Direct and Indirect Effects of the Action Alternative to Soils***

 Based on DNRC soil monitoring, direct impacts would be expected on up to 41 of the total 448 acres proposed for harvesting. Soil monitoring conducted on DNRC lands shows that sites harvested on Stillwater State Forest on similar soils with ground-based machinery had a range of impacts from 4.6 to 9.0 percent of the acres treated (*DNRC, 2004*). This range of impacts includes operations on dry soils as well as frozen or snow-covered soils. As a result, the extent of impacts expected would likely be similar to those reported by *Collins* (*DNRC 2004*), or approximately 4.6 to 9.0 percent of ground-based harvested acres. Potential impacts to soils from cable-yarding units would be less than 10 percent of the area, provided corridors are approximately 75 feet apart and have impacts confined to a 6– to 8-foot width.

 Ground-based site preparation would also generate direct impacts to the soil resource. Site-preparation disturbance would be intentionally done; these impacts are considered light and promote reforestation of the site. Approximately 0.25 acre of new road would be constructed with the Active Alternative. This road would generate less than 1.0 acre of additional direct impacts to soil physical properties beyond the harvesting activities. *TABLE III-6 - SUMMARY OF DIRECT EFFECTS OF ALTERNATIVES ON SOILS* summarizes the expected impacts to the soil resource as a result of the Action Alternative. These activities would leave up to 9.2 percent of the proposed harvest units in an impacted condition. This level is below the range analyzed for in the *EXPECTED FUTURE CONDTIONS* section of the *SFLMP*, and well within the 20 percent of impacted area

TABLE III-6 – SUMMARY OF DIRECT EFFECTS OF ALTERNATIVES ON SOILS

DESCRIPTION OF PARAMETER	**ALTERNATIVE**	
	NO ACTION	**ACTION**
Acres of harvesting	0	448
Acres of tractor yarding	0	402
Acres of skid trails and landings	0	45
Acres of cable yarding	0	19 to 36
Acres of yarding corridors	0	5
Acres of moderate impacts	0	24 to 41
Percent of harvest area with impacts	0	5.4 to 9.2

established as a level of concern in the *SFLMP (DNRC, 1996)*. In addition, BMPs and a combination of mitigation measures would be implemented to limit the area and degree of soil impacts as noted in *ARM 36.11.422* and the *SFLMP (DNRC, 1996).*

CUMULATIVE EFFECTS

- ***Cumulative Effects of the No-Action Alternative to Soils***

 No cumulative impacts to the physical properties of soils in the project area would be expected. The impacts would be similar to those described in the *EXISTING CONDITIONS* portion of this analysis. No soil would be disturbed and no reentry of past harvest units would occur. All impacts from past management activities would continue to improve or degrade as dictated by natural and preexisting conditions.

- ***Cumulative Effects of the Action Alternative to Soils***

 Approximately 151 acres with previous timber sale operations would be entered. Cumulative effects to soils may occur from repeated entries into a forest stand where additional ground is impacted by equipment operations. Existing skid trails where compaction has begun to ameliorate through freeze-thaw cycles and revegetation would return to a higher level of impact due to this alternative. Additional trails may also be required if existing trails are in undesirable locations. Cumulative impacts to physical properties of soils under this alternative would still fall below the range analyzed for in the *EXPECTED FUTURE CONDITIONS* section of the SFLMP and are well within the 20-percent impacted area established as a level of concern in the *SFLUMP (DNRC, 1996)*.

 DNRC would minimize long-term soil impacts and adverse cumulative effects by implementing any or all of the following:

 - Existing skid trails from past harvesting activities would be used if they are properly located and spaced.
 - Additional skid trails would be used only where existing trails are unacceptable.
 - The potential direct and indirect effects would be mitigated with soil-moisture restrictions, season of operation, and method of harvest.
 - A portion of coarse woody debris and fine litter would be retained for nutrient cycling.

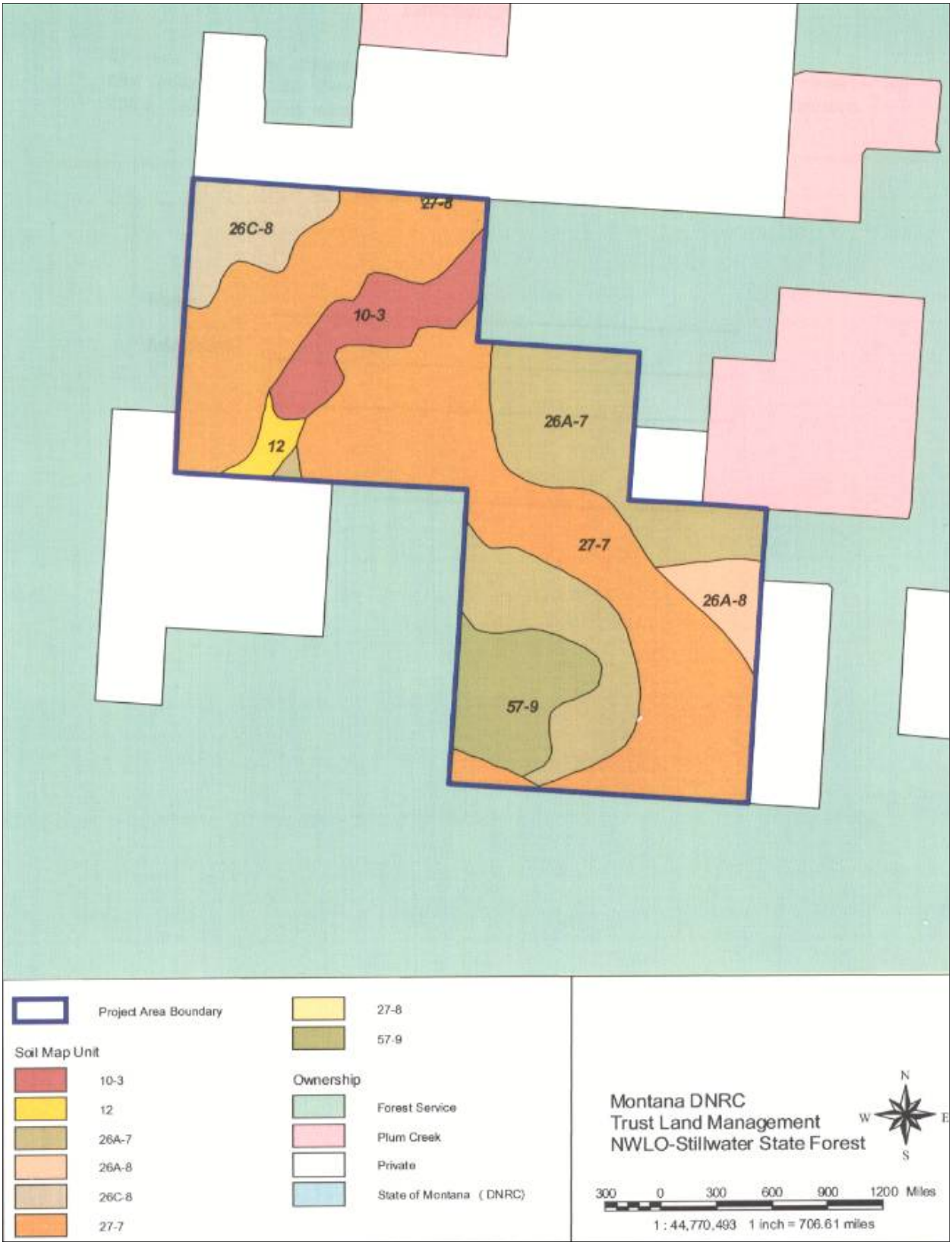
 In previously unharvested stands, effects to physical properties of soil would be the same as those listed in the *DIRECT AND INDIRECT EFFECTS* section.

TABLE III-7 – SOIL MAP UNIT DESCRIPTIONS FOR THE SHORTS MEADOW/EVERS CREEK TIMBER SALE PROJECT

MAP UNIT[1]	DESCRIPTION	SOIL DRAINAGE	ROAD LIMITATIONS	TOPSOIL DISPLACEMENT AND COMPACTION	SEEDLING ESTABLISHMENT	EROSION (BARE SURFACE)	NOTES
10-3	Alluvial soils	Poor to well drained	Moderate to severe	Severe	Good	Low	Streamside management guides will be applied.
12	Organic depressions	Poor	Severe	Severe	Poor	Slight	Wetland soil types, avoid operation
26A-7	Deep glacial till, 0-20%	Well drained	Low	Moderate (severe if wet)	Good	Low	Deep, productive soil well suited to tractor operation. Limited dry season of use.
26A-8	Glacial till, 20-40%	Well drained	Moderate	Moderate	Good	Moderate	Deep, productive soil. Fine-textured soil remains moist; check soil moisture. Topsoil depth important.
26C-8	Glacial moraines, 20-40%	Well drained	Moderate/ high	Moderate/ high	Good	Moderate	Deep, productive soil. Topsoil depth important.
27-7	Glacial kames and kettles, 10-20% slopes	Well drained	Low	Low	Fair	Moderate	Deep soil, low fertility. Topsoil depth is very important.
27-8	Glacial kames and kettles, 20-40% slopes	Well drained	Low	Low	Fair	Moderate	Topsoil depth is very important. Moisture stress may affect seedling establishment
57-9	Glaciated mountain slopes, 40-60%	Well drained	Moderate	Severe displacement	Fair to good Dry on south slopes	Moderate	Steep slopes; limit tractor operation. Use cable or helicopter yarding system.

[1]*Flathead National Forest Land Types. Interpretations taken from: Martinson and Basko, 1998. Soil Survey of Flathead National Forest Area, Montana. USDA Forest Service.*

FIGURE III-2 - SHORTS MEADOW/EVERS CREEK SOIL MAP UNITS



FISHERIES ANALYSIS

INTRODUCTION

Evers Creek contains a population of eastern brook trout. No other streams in the project area were found to contain fish, and no federally listed threatened, sensitive, or endangered fish were found in project-area streams.

ANALYSIS METHODS

Methodology to assess the status and potential impacts of the proposal to fish populations will include discussions of habitat quality and risk factors to habitat degradation. Risk factors include fine sediment delivery and stream shade and temperature.

The risk factors to habitat degradation were evaluated in 2006 through a sediment-source inventory in the proposed project area and road system leading into the proposed project area. The inventory included an assessment of channel stability and out-of-channel sediment sources.

ANALYSIS AREA

The fisheries analysis area is Evers Creek within and below the proposed project area. The analysis will also include a qualitative discussion of fish use in Logan Creek above Tally Lake, which lies south of the proposed project area.

EXISTING CONDITIONS

DFWP has identified the presence of eastern brook trout in the Evers Creek watershed. Channel-stability surveys by DNRC personnel during 2006 confirm this presence in Evers Creek within the proposed project area. DFWP has classified North Fork Evers Creek as non-fish-bearing. Electroshock surveys conducted by a DNRC fisheries biologist in 2006 confirmed the absence of fish in North Fork Evers Creek.

Instream fish habitat in Evers Creek is primarily cobble/gravel substrate, or a sand/silt channel bottom. Reaches with higher gradient B-channel types, as defined in *Applied River Morphology (Rosgen 1996)*, have cobble and gravel substrate due to higher velocities. This leaves clean cobble and gravel for eastern brook trout spawning and rearing. The reaches with a finer, sandy substrate are mainly where the channel is very low gradient and flows through a series of wet meadows and marshes. Large woody debris consists mainly of material 4 to 6 inches in diameter and less in most reaches. This is primarily because most of Evers Creek within the proposed project area flows through wetlands and marshes that contain brush and forbs. Where reaches flow through forested areas, large logs are found in the channel approximately 50 to 75 feet apart. These logs, generally well entrenched in the channel and banks, provide excellent structure and cover for fish species.

The sediment-source inventory conducted in 2006 showed no existing point sources of sediment within the channels or from upland sites. Stream channels in the proposed project area are primarily in fair to good condition. The existing road system in and leading to the proposed project area was reviewed for potential sources of sediment. The road system in the project area is mainly low to moderate standard, but is not actively contributing sediment to streams or fish habitat. Road surfaces are well vegetated and are not delivering to crossings. Past project work has installed surface drainage features on most of the existing road system, but reaches of the existing road system are in need of BMP work to reduce the risk of surface erosion and sediment delivery.

Logan Creek is used by bull trout in reaches above Tally Lake. Spawning reaches are located upstream from

the proposed project area. An unnamed tributary to Logan Creek originates in the proposed project area. This intermittent stream goes dry during the summer and may deliver surface water to Logan Creek above Tally Lake during high-flow periods. This stream channel is in good condition, has healthy streamside vegetation, is not actively eroding, and has no identified in-channel sediment sources. No road crossings are located on this stream, and no roads are located within the SMZ of this unnamed tributary.

ALTERNATIVE EFFECTS TO FISHERIES

DIRECT AND INDIRECT EFFECTS

- ***Direct and Indirect Effects of the No-Action Alternative to Fisheries***

 No direct or indirect effects on fish populations or fish habitat would be expected in the Evers Creek or Logan Creek watershed. Direct and indirect effects would be limited to those under current and natural conditions.

- ***Direct and Indirect Effects of the Action Alternative to Fisheries***

 Timber would be harvested from approximately 448 acres; approximately 151 acres are previously managed land, the rest has not been managed for timber. Proposed harvesting would be completed using ground-based and cable yarding machinery. Approximately 7 acres of the proposed units are located within the Evers Creek SMZ and the SMZ of the unnamed tributary to Logan Creek above Tally Lake. Harvesting would remove 50 percent of the trees in the SMZs and RMZs. As a result of the proposed SMZ harvest, the risk of sediment deliver to these streams would be low due to equipment restrictions and operation during periods of dry, frozen, or snow-covered conditions (see *WATERSHED AND HYDROLOGY* ANALYSIS for a more detailed discussion of sediment delivery). All proposed timber management within these areas will meet applicable SMZ rules and would satisfy *ARM 36.11.425(5)* through *425(9)*. As a result, a low risk of adverse effects is expected to stream shading, stream temperature, and large woody debris recruitment in Evers Creek and the unnamed tributary to Logan Creek.

 The Action Alternative would install surface-drainage features on portions of the existing road system. Most of the areas needing this work are located well away from Evers Creek. These activities would slightly increase the short-term risk of sediment delivery to fish habitat in Evers Creek by exposing bare soil. In addition, use of the road system in the project area would decrease the effectiveness of the existing grass cover, which would also increase the risk of sediment delivery to fish habitat in Evers Creek. Overall, a low risk of low impacts to fish habitat from the proposed project area would be expected due to erosion-control BMPs; this risk would decrease to preproject levels within approximately 3 years after project completion due to revegetation of bare soil.

CUMULATIVE EFFECTS

- ***Cumulative Effects of the No-Action Alternative to Fisheries***

 The cumulative effects would be similar to those described in *EXISTING CONDITIONS*. Water yield would increase due to ongoing timber management on FNF land, but have a low risk of affecting stream channel stability or fish habitat (see *WATERSHED AND HYDROLOGY ANALYSIS* for a more detailed analysis). Fish habitat and populations would not be altered.

- ***Cumulative Effects of Action Alternative to Fisheries***

 The cumulative effects would be related primarily to the risk of fine sediment delivery to a spawning stream. The risk of increased sediment loads from in-channel sources is low because the water-yield increase has a low risk of affecting channel stability (see *WATERSHED AND HYDROLOGY ANALYSIS*). Introduced sources of sediment would be related primarily to proposed erosion-control BMP installations. These impacts would be short term during the course of operation. Within 2 to 3 years of project completion, the supply of fine sediment would return to levels described in *EXISTING CONDITIONS*, and the long-term risk of road sediment delivery to Evers Creek would be reduced. This would lead to a cumulative improvement to fish spawning and rearing habitat in the Evers Creek watershed.

 The effects of past ground-based operation in the proposed project area have not led to any identified sources of sediment to spawning sites in Evers Creek or to the unnamed tributary to Logan Creek. The inclusion of the direct and indirect effects expected from the action alternative to the existing conditions would have a low risk of changing this. As a result, the Action Alternative would have a low risk of adverse cumulative impacts on fisheries populations in the Evers Creek watershed, the unnamed tributary to Logan Creek, or in downstream waters.

AESTHETICS ANALYSIS

INTRODUCTION

The methodologies used to portray the existing conditions and determine impacts to the visual resources include an analysis of the foreground and middleground views. No background views are visible from open roads or residences within the project area. The foreground views will be discussed with regard to vegetation, soil disturbance, and changes to stand conditions. The effects of these changes will be based on the size of the openings and their distance from open roads or private property. Middleground views will be analyzed based on elements such as color, line, and texture in relation to the extent of openings that the harvest operations would create. DNRC received comments from adjacent landowners who are concerned about the view shed from their properties and Star Meadows Road (USFS Road 539), a year-round open road that is traveled daily by residents in this area.

EXISTING CONDITION

For approximately 1.5 miles, Star Meadows Road passes through State land, thus creating a foreground view on both sides of the road. Due to the rolling topography, this section of road does not afford a middleground view. The foreground view consists mainly of multistoried stands that were selectively harvested over the years to improve stand health and vigor. One older stand that had a regeneration harvest is completely stocked with mostly lodgepole pine saplings.

Private property is interspersed with State and USFS ownership throughout this area, and the proposed harvest areas can be seen from a number of places on private land. In addition, several fairly large wetlands are adjacent to the proposed harvest areas. Concern was expressed by adjacent landowners that the visual quality of these areas could be compromised by harvesting activities. In the past, the residents have enjoyed a pristine vista comprised of a mosaic of open, brush-dominated wetlands in contrast to the heavy, timber-dominated canopy of the adjacent stands.

ALTERNATIVE EFFECTS TO AESTHETICS

DIRECT AND INDIRECT EFFECTS

- ***Direct and Indirect Effects of the No-Action Alternative to Aesthetics***

 Excluding natural events such as wildfire, weather, and outbreaks of insect infestations and infectious diseases, the views into the project area from Star Meadows Road or private properties would not change in the near future.

- ***Direct and Indirect Effect of the Action Alternative to Aesthetics***

 Damage to vegetation and disturbance of soil visible as foreground views would have short-term effects with the application of mitigation measures. These measures include, but are not limited to:

 - employing a commercial-thin treatment method in the proposed harvest areas adjacent to Star Meadows Road or some of the larger wetlands;
 - slashing and piling (if funds are available) damaged residual vegetation;
 - limiting the location, size, and number of landings;
 - grass seeding disturbed areas;
 - retaining small trees and brush along open roads; and
 - delineating irregular boundaries.

 The proposed silvicultural treatments for this alternative are primarily seedtree and commercial thin. In the proposed seedtree harvest areas, two-

storied and multistoried stands would be temporarily converted to open, single-storied stands of larger-diameter western larch and Douglas-fir. The foreground viewing distance into harvest units would be increased for a time due to the reduction in tree densities. As time passes, the openings would fill in with seedlings, and later, saplings. Eventually, the stands would revert to the two-storied and multistoried structures seen today, or at least similar to what is currently visible. In the commercial-thin harvest areas, the openings would be smaller and less noticeable as the distance between retained trees would be much less. Likewise, in time, these stands would fill in somewhat with seedlings and saplings.

The middleground views of the treated areas would have an open appearance with the retention of scattered overstory trees. Stand texture would change due to sharp contrasts (in texture) between the treated and untreated stands. This would be even more apparent when snow is covering the ground.

In stands adjacent to the larger wetlands, more trees than usual could be retained in order to break up the sharp contrast between wetland, heavily timbered, and regeneration harvest. This technique, known as “feathering”, could be employed when not in conflict with silvicultural objectives.

CUMULATIVE EFFECTS

- ***Cumulative Effects of Both Alternatives to Aesthetics***

 As fuel loading continues to build, damaging wildfire risks would also increase. Wildfires occurring in these areas may be intense and extensive with the potential to change views over a large area quickly. Timber harvesting on adjacent properties and all ownerships would likely continue, thereby changing both the foreground and middleground aesthetics in this area.

ECONOMIC ANALYSIS

METHODS

The economic analysis will include estimates of costs, revenues, and returns; these estimates are intended for the relative comparison of alternatives and are not intended for use as absolute estimates of return. The stumpage value was estimated to equal the delivered log prices minus costs. Stumpage prices from recent local sales were also considered as an indication of the current market. The *Montana Sawlog and Veneer Log Price Report*, based on July to September 2006 data and revised on November 29, 2006, were used for the delivered price per species. Costs include estimated development, logging, and hauling costs and Forest Improvement (FI) payments.

EXISTING CONDITION

Based on past study, 20 to 35 percent of the economy of Flathead County can be attributed to the wood-products industry (*The Role of the Wood Products Industry in the Economy of Flathead County, Montana, an estimate of the Effects on Total Employment Using Input-Out Analysis, Beckly 1994)*.

Stumpage prices, which are currently flat and near the long-term average, are highly dependant on the housing market, which is partially dependant on the interest rate. The economy is in a period of steady growth. Additionally, the housing market has generally been very strong, and only recently have housing starts shown some weakening. These factors have resulted in timber prices at or near historical averages. The timber prices used in this analysis attempt to recognize the current market conditions.

ALTERNATIVE EFFECTS

DIRECT EFFECTS

- ***Direct Effects of the No-Action Alternative to Economics***

 Revenue from the project area would not be realized at this time.

- ***Direct Effects of the Action Alternative to Economics***

 An estimated $623,955 in project revenue would be deposited in the Public Buildings and School for the Deaf and Blind trust accounts. An estimated $57,525 in revenue would be deposited into the FI account. Approximately $8,523 of road improvement work would also be accomplished.

TABLE III-8 - COSTS AND BENEFITS ASSOCIATED WITH PROJECT BY ALTERNATIVE

	ALTERNATIVES	
	NO-ACTION	**ACTION**
Estimated total harvest volume (MMbf)	0	2.95
Road development costs ($/Mbf)		2.89
Estimated stumpage value ($/Mbf)		211.51
FI fee ($/Mbf)		19.50
Estimated stumpage value, FI, and development cost ($/Mbf)		233.90
Total timber-dollar value based on estimated stumpage value, FI, and road-development value, multiplied by the estimated harvest volume.	0	690,005
Estimated stumpage value and FI ($/Mbf)		231.01
Total revenue ($) to the State (stumpage value and FI)	0	681,480
Total revenue to Public Buildings and School for the Deaf and Blind trusts (stumpage value)	0	623,955

INDIRECT EFFECTS

- ***Indirect Effects of the No-Action Alternative to Economics***

 The existing timber stand conditions include a substantial amount of timber value lost from mortality and stem rot. A considerable amount of timber would deteriorate beyond commercial value for forest products if no harvesting takes place in the near future.

- ***Indirect Effects of the Action Alternative to Economics***

 No appreciable changes to the existing annual cash flow for DNRC's timber program would take place. Cost for site preparation and reforestation would be reinvested into the harvest units from the FI account (approximately $126 per acre, for a total of $57,525).

CUMULATIVE EFFECTS

- ***Cumulative Effects of the No-Action Alternative to Economics***

 No change to the area's economy would be expected provided a local mill purchases a substituted amount of timber. Lack of a viable substitution could result in a negative effect to DNRC's annual cash flow.

- ***Cumulative Effects of the Action Alternative to Economics***

 If implemented, a local mill would likely purchase this timber sale, and the local economy would benefit from the availability of the sold stumpage.

WILDLIFE ANALYSIS

INTRODUCTION

DNRC conducts coarse- and fine-filter analyses to assess the wildlife effects of each project. The coarse-filter analysis compares the current conditions and the expected changes against the estimated "historic" condition, with the assumption that if habitat conditions and patterns were similar to those historically present, native wildlife species would have adequate habitat. The fine-filter analysis is a species-specific assessment to describe the effects to species that are rare, listed as threatened or endangered, or are managed as big game by DFWP. In both analyses, the changes expected under each alternative are compared against the existing condition. These changes provide the basis for the effects expected under each alternative.

COARSE-FILTER ANALYSIS

The wildlife coarse-filter analysis analyzes the existing condition and proposed changes in covertype, age class, and deadwood (snags and logs) structure as compared to habitat conditions expected under historic conditions. This analysis relies heavily on the vegetation analysis and will refer to tables and assessments made in that section of this document.

COVERTYPES

In the absence of natural disturbances, timber stands tend to convert from stands dominated with shade-intolerant tree species to stands dominated with shade-tolerant tree species. In addition, stands dominated with shade-tolerant species tend to possess denser crown closure and multilevel canopies. Understory vegetation is variable, but generally less available in denser stands with multiple canopy layers. Currently, the vegetation makeup of the project area is a mixture of regenerating shade-intolerant stands with older stands of varying compositions. The vegetation analysis shows that western larch/Douglas-fir stands are the most common covertypes in the project area, followed by mixed-conifer covertypes. Approximately 42.2 percent of the project area has been harvested in the last 30 years, and an additional 51.4 percent of the project area received harvests more than 30 years ago.

For cumulative effects, all lands managed by Stillwater Unit were considered. This analysis shows that Stillwater State Forest is underrepresented by the western larch/Douglas-fir covertype by nearly 22 percent and overrepresented by the mixed-conifer covertype by 19.6 percent as compared to the estimated average historical covertype distribution within the climatic section. Therefore, wildlife species that use denser, multilayer, and/or shade-tolerant tree species likely gained habitat when compared to historical amounts, at the expense of species that use habitats dominated by more open, shade-intolerant tree species.

ALTERNATIVE EFFECTS TO COVERTYPES

Direct and Indirect Effects

- ***Direct and Indirect Effects of the No Action Alternative to Covertypes***

 No harvesting and no conversion of mixed-conifer stands would occur. Since most of these stands have been harvested previously and are currently in a western larch/ Douglas-fir covertype, no changes in the amount of habitat conditions are expected. As these stands age, they could become more dense and closed-canopied. This alternative is expected to negligibly affect the species that are currently using the project area.

- ***Effects of the Action Alternative on Covertypes***

 This alternative would convert 171 acres of mixed conifer and 23 acres of lodgepole pine covertypes into western larch/Douglas-fir covertypes. The remaining 252 acres of western larch/Douglas-fir and 3 acres of lodgepole pine covertypes would remain in their respective covertypes following harvesting. In all cases, the density and canopy closure within these stands would be substantially reduced, except in Unit 4 (4 acres). Therefore, species that use more open stands would benefit from this alternative at the expense of those species that use denser stands.

Cumulative Effects

- ***Cumulative Effects of the No-Action Alternative on Covertypes***

 This alternative would not be cumulative to other covertype conversions occurring with other timber harvests on Stillwater State Forest. The stands proposed for harvesting likely would not convert to mixed-conifer covertypes in the near future. Therefore, wildlife habitats associated with covertypes are likely to remain in similar proportions for a long period of time.

- ***Cumulative Effects of the Action Alternative on Covertypes***

 The Action Alternative would add to the covertype conversions produced by other timber harvests on Stillwater State Forest. This alternative would convert covertypes that are currently overrepresented on Stillwater State Forest to covertypes underrepresented as compared to the estimated historical proportions. Therefore, this alternative moves the acreage proportions of stands toward estimated historical proportions, which could benefit species that lost habitat due to forest succession, resulting in an overall minor benefit to native species.

AGE CLASS

In the absence of disturbance, stands not only change covertypes over time, but increase in density and age. As stands get older, they generally become more complex. In a natural regime, fire provided the most common and widespread disturbance in western Montana. Generally, fires occur in 3 general patterns: nonlethal, mixed severity, and stand replacing. Any pattern is likely in any stand; however, stands tend to have a predominate regime. Stands in the project area tend towards the mixed-severity patterns in the drier areas and stand-replacing patterns in the wetter areas. In the mixed-severity regimes, fire return intervals are shorter and provide a mosaic of effects. Over most of the area, the understory and regenerating shade-tolerant trees tend to be thinned or killed, while older trees are more likely to survive. Additionally, pockets of stand-replacing events occur. Where stand-replacing events occur, most trees in the area are killed. The effects of the fire regime are evidenced in the proportions of stands within each age class.

For the coarse-filter analysis, the analysis of age class was conducted on Stillwater State Forest (*TABLE III-9 - THE CURRENT COMPARED TO THE HISTORIC ESTIMATES OF AGE CLASS DISTRIBUTIONS ON THE STILLWATER STATE FOREST*). Currently, the age-class distribution is approaching historic amounts, with higher proportions in the older age classes and lower proportions in the younger classes. Therefore, native species that use mature and older stands tend to have gained habitat at the expense of those species that tend to use regenerating and pole stands.

TABLE III-9 - THE CURRENT COMPARED TO THE HISTORIC ESTIMATES OF AGE CLASS DISTRIBUTIONS ON STILLWATER STATE FOREST*

AGE CLASS	ESTIMATED CURRENT PROPORTIONS	ESTIMATED HISTORIC PROPORTIONS
0-to-39-year	13.6%	22.8%
40-to-99-year	22.8%	17.9%
100-to-150-year	13.8%	24.7%
150+-year	45.8%	32.8%
No age provided in SLI*	3.9%	

** These estimates represent the average age structure for the climatic type [Section M333C] weighted by the desired future condition covertype proportions found on Stillwater State Forest.*

Alternative Effects to Age Class

- ***Direct, Indirect, and Cumulative Effects to Age Class Common to the No-Action and Action Alternatives***

 Under either alternative, age class proportions within Stillwater State Forest would not change. However, the amount and structure within stands would be altered between the alternatives. Therefore, habitat based on age-class distribution would not change; however, species that use older-aged stands with a more complex structure would lose habitat under the Action Alternative as compared to the No-Action Alternative. These changes would be additive to other timber harvests on Stillwater State Forest.

DEADWOOD

Deadwood is made up of standing dead trees (snags) and trees when they fall to the ground (logs). Snags and logs provide important habitat structure for wildlife species. To manage deadwood resources, DNRC manages for snag-recruitment trees, snags, and coarse woody debris. The natural fire regimes (mixed-severity regimes) of the area indicate that snag recruitment is generally consistent over time, with small areas of high density pulses occurring where flame-ups or stand-replacing events historically occurred. Therefore, the amount of historic snag densities that are expected should approximate the mean densities reported in *Harris (1999)* for Habitat Type Groups B (SLI group 4), D (6), E (7), G (9), H (10). According to *ARM 36.11.411*, all these groups, except Habitat Type Group D, are to have at least 1 snag and 1 snag recruit tree per acre over 21 inches dbh. Habitat Type Group D is required to have 2 snags and 2 snag-recruitment trees per acre following harvesting (*TABLE III-10 - THE EXPECTED LARGE-SNAG DENSITY BASED ON HABITAT TYPE GROUP*). If trees/snags over 21 inches dbh are not available, the next largest trees would be retained. Field review of the project area indicates that few large snags (greater than 21 inches dbh) and some medium-sized snags (greater than 15 inches dbh) are present in the area. However, numerous areas have high densities of logs, primarily downed lodgepole pine and Engelmann spruce. These conditions lead to reduced habitat available for species that use snags, and pockets of high quality habitats for species that require logs to meet their life requirements.

TABLE III-10 - THE EXPECTED LARGE-SNAG DENSITY BASED ON HABITAT TYPE GROUP

EXPECTED HISTORICAL DENSITY OF LARGE SNAGS	TOTAL
At least 1 snag per acre	1,006
At least 2 snags per acre	376
No snags per acre	62
Grand total	1,444

- ***Direct and Indirect Effects of the No-Action Alternative on Deadwood***

 No harvesting would occur. Trees would continue to grow and die. Current spruce beetle activity would continue to produce spruce snags for snag-associated species. Log structure would continue to develop and decay into the soil. Overall, deadwood resources would continue to develop, thereby benefiting species that use deadwood structure.

- ***Direct and Indirect Effects of the Action Alternative on Deadwood***

 This alternative would harvest timber within 448 acres of mature forested stands. Within these areas, a minimum of 1 (262 acres) or 2 (186 acres) recruitment trees and snags per acre would be retained, depending on the habitat types. Where possible, additional cull trees would be retained to reduce losses to the deadwood resources. A minimum of 10 to 20 tons of coarse woody debris would also be retained to provide some habitat retention for species that use log structures. However, this harvesting would further reduce the structure available for species that use deadwood, especially those species that use medium to small snag structures.

- ***Cumulative Effects Common to the No-Action and Action Alternatives on Deadwood***

 Previous timber harvests reduced the availability of deadwood structure. Additional harvests on the adjacent USFS lands are expected to reduce snag resources to a slight degree. Overall, either alternative combined with previous and current harvests would likely produce negligible effects to species that use deadwood to fulfill their life requirements. However, the No-Action Alternative is expected to result in lesser effects.

FINE-FILTER ANALYSIS

To determine what species are considered in the fine-filter analysis, a cursory assessment was conducted of habitat components and wildlife species potentially affected in the area. If a species or their habitat is present in the project area and could be affected by the proposed project, that species received an in-depth analysis. If a species is unlikely to use the habitat or suitable habitat is lacking, that species was dismissed from further analysis. To assess species presence and habitat characteristics, wildlife observation data and habitat information were assembled from the Montana Natural Heritage Program, wildlife biologists working in or near the project area, SLI data, interpretation of 2005 National Agricultural Imagery Program (NAIP) images, and field observations. *TABLE III-11 - STATUS OF SPECIES CONSIDERED IN THE FINE FILTER ANALYSIS FOR THIS PROJECT* summarizes the cursory findings of all species considered for the fine-filter analysis.

For species or habitat components that could be affected by the project, an analysis area was defined. This analysis area generally provides enough habitat or area to support a home range or group of home ranges used by the species in question. For each analysis area, a baseline condition was defined. The wildlife analysis compares the direct, indirect, and cumulative effects of each alternative to the baseline condition to measure effects. Direct effects are associated with the activities that would occur under each alternative; indirect effects are separated from the direct effects by time or space; and cumulative effects consider past, present, and future actions that could contribute to the effects to the habitat conditions or species in question. The existing condition

recognizes the effects of past activities, but, in most cases, does not specifically attribute those effects to the specific event.

TABLE III-11 - STATUS OF SPECIES CONSIDERED IN THE FINE-FILTER ANALYSIS FOR THIS PROJECT

STATUS	SPECIES	DETERMINATION - BASIS
Threatened and Endangered Species	Canada lynx	*Included* – Habitat modeling indicates that most of the project area supports forested habitat types consistent with those used by lynx.
	Grizzly bear	*Included* – The project area occurs in occupied habitat approximately 5 miles west of the Lazy Creek Grizzly Bear Subunit of the Northern Continental Divide Ecosystem (NCDE).
	Gray wolf	*Included* – The 2005 Lazy Creek Pack home range includes the middle portion of the project area.
Sensitive Species	Black-backed woodpecker	No further analysis conducted – No burned habitat occurs in the project area.
	Coeur d'Alene salamander	No further analysis conducted – No moist talus or streamside talus habitat occurs in the project area.
	Columbian sharp-tailed grouse	No further analysis conducted – No suitable grassland communities occur in the project area.
	Common loon	No further analysis conducted – No lakes occur in or near the project area.
	Fisher	*Included* – The upland and riparian habitats in the project area support habitat characteristics consistent with those used by fishers.
	Flammulated owl	No further analysis conducted – No dry ponderosa pine habitats occur in the project area.
	Harlequin duck	No further analysis conducted – No suitable streams occur in the project area.
	Northern bog lemming	No further analysis conducted – No sphagnum bogs or other fen/moss mats occur in the area.
	Peregrine falcon	No further analysis conducted – No potential habitat is expected in the project area.
	Pileated woodpecker	*Included* – Western larch/Douglas-fir and ponderosa pine habitats occur in the area.
	Townsend's big-eared bat	*No further analysis conducted* – No caves or mine tunnels occur in the project area.
Big Game Species	Elk	*Included* – Nonwinter use
	Moose	*Included* - Year-round use
	Mule deer	*Included* – Nonwinter use
	White-tailed deer	*Included* – Migration route

THREATENED AND ENDANGERED SPECIES

- **Canada Lynx**

 Issue: Timber harvests could remove habitat for lynx, reducing the potential of the area to support lynx.

 The project area supports habitat types and conditions that could provide habitat for Canada lynx. Based on the DNRC modeling protocol, the project area contains denning, mature foraging, other, and temporary non-lynx habitat mainly below 4,000 feet in elevation. Field observations indicated that the mature foraging and temporary non-lynx habitat actually provided overhead cover, but lacked dense understory needed to provide snowshoe hare habitat. Therefore, these stands better fit the definition of *Other* habitat and were considered such for this analysis (*TABLE III-12 – LYNX HABITAT COMPONENTS FOUND ON DNRC-MANAGEMENT LANDS WITHIN THE PROJECT AREA*). The modeled denning habitat appears to provide some areas of dense coarse-woody-debris buildup. However, the log sizes are generally smaller-diameter lodgepole pine, but in places logs are jackstrawed to provide potential denning habitat. Since the lynx habitat provided within the project area occurs just upslope of the Flathead Valley floor and below 4,000 feet in elevation, lynx use of the area unlikely.

TABLE III-12 - LYNX HABITAT COMPONENTS FOUND ON DNRC-MANAGED LANDS WITHIN THE PROJECT AREA

LYNX HABITAT COMPONENT	ACRES	PERCENT OF LYNX HABITAT
Denning	55	4.1
Other	1,281	95.8
Grand total	1,336	100.0

When considering the entire analysis area, which included the project area and adjacent sections, additional lynx habitat could occur on the USFS lands to the west and private lands to the north. Conversely, lynx habitat is unlikely on private lands to the south and mixed ownerships to the east due to the lower elevation and close proximity to the white-tailed deer winter range.

Alternative Effects to Canada Lynx

Direct and Indirect Effects

- ***Direct and Indirect Effects of the No-Action Alternative to Canada Lynx***

 No lynx habitat would be affected. In the short-term, this alternative would not affect lynx. In the longer term, denning habitat would increase and foraging habitat would likely not develop to an appreciable degree in the understories of the existing stands.

- ***Direct and Indirect Effects of the Action Alternative to Canada Lynx***

 Harvesting is proposed on 409 acres of *Denning* and *Other* habitat. A 10-acre harvest unit located along the northwestern edge of the project area was dropped from this alternative to retain a minimum of 5 acres of denning habitat, thereby complying with *ARM 36.11.436(8)[a]*. For the remaining harvest units, harvest prescriptions vary from seedtree to commercial thin. Where canopy cover retention exceeds 40 percent, *Other* lynx habitat would be retained. Where canopy cover is reduced to less than 40 percent, the area would be temporary unsuitable for lynx. In all units, except Unit 4, a majority of canopy cover in each harvest unit would likely be reduced to less than 40 percent; therefore, all harvest unit acres were considered temporary non-lynx habitat. Conversely, Unit 4 would remain *Other* habitat

following harvesting. Therefore, 405 acres (30.3 percent) of lynx habitat would be converted to temporary non-lynx habitat leaving 16 acres (1.2 percent) of *Denning* habitat and 898 acres (67.2 percent) of *Other* habitat within the project area. Therefore, this alternative adheres to *ARM 36.11.435*. The 405 acres affected by this alternative would likely regenerate to *Young Foraging* (10 to 30 years) or *Other* habitat (20 to 40 years), depending on the density of regeneration. Since the project area is likely marginal lynx habitat, the short-term reduction in available habitat and the longer term potential increase in foraging habitat would likely have negligible effects to lynx.

Cumulative Effects to Canada Lynx

- ***Cumulative Effects to Canada Lynx Common to the No-Action and Action Alternatives***

 In addition to the effects discussed above, harvests on private lands removed potential lynx habitat. However, these areas are below the project area and likely did not contain habitat. On USFS lands, lynx habitat is more likely, especially to the west of the project area. The *Logan Creek Ecosystem Restoration Project* analyzed lynx habitat and the impacts of the proposed activities in the Evers Reid Lynx Analysis Unit (LAU) to find that denning and foraging habitat was adequate for the LAU (*USDA Forest Service, 2004*). The USFS analysis did not consider most stands in the project area as lynx habitat because these lands lie below 4,100 feet in elevation. The Forest Service analysis included 46 acres within the Shorts Meadow/Evers Creek Project area (Section 24) as lynx habitat; however, these acres are not proposed for harvesting under the Short's Meadow/Evers Creek Timber Sale Project. Therefore, since adequate habitat is available for lynx in the USFS-defined LAU and the proposed harvest units were not considered as lynx habitat in that analysis, the changes discussed above would not reduce the analysis area's ability to support lynx.

- **Gray Wolf**

 Issue: Timber harvests and road use could result in reduced security for wolves, resulting in reduced habitat availability and/ or increased mortality due to illegal killing.

 The 2005 Lazy Creek Pack home range included the middle portion of the project area (*USFWS et al. 2006*). Previously, the Lazy Creek pack stayed to the east of the project area (*U.S. Fish and Wildlife Service* [*USFWS] et al. 2003, USFWS et al. 2004, USFWS et al. 2005*). Continued use of the project area is likely, but could shift over time.

 Wolf security, risk of mortality, and avoidance of habitat can be associated with human access and vegetation manipulation. Unrestricted and restricted roads provide human access as well as travel routes for wolves. *Boyd and Pletscher (1999)* found that 80 percent of wolf mortalities were human-caused, with 21 of 25 human-caused wolf mortalities occurring within 200 meters of a road or seismic line. Therefore, roads can provide a surrogate measure of mortality risk to wolves. In addition to human access routes, the sight distance (distance at which an animal can be detected) within harvest units can provide another measure to assess human-caused mortality risk. Retention of visual screening along roads and within harvest units likely

reduces the risk of mortality by limiting the distance at which an animal could be detected and/or shot.

Alternative Effects to Gray Wolves

Direct and Indirect Effects

- ***Direct and Indirect Effects of the No-Action Alternative to Gray Wolves***

 The existing vegetation, along with the amount and location of existing roads, would remain unchanged. Therefore, no change in wolf security or risk of mortality is expected.

- ***Direct and Indirect Effects of the Action Alternative to Gray Wolves***

 Approximately 448 acres of forested habitats would be harvested, no additional roads would be constructed, and the existing closure devises would be enhanced to reduce illegal motorized use. Vegetation strips would be retained along open roads and pockets of regenerating trees and unharvested trees would be retained within all harvest units to break up sight distances. Contract stipulations would prohibit contractors from carrying firearms while on duty and require the contractor to prevent public access on restricted roads along haul routes during periods of inactivity (nights, weekends, shutdown periods, etc.). If a den or rendezvous site were discovered, contract stipulations would require that the operator cease operations until adequate measures to protect the site were in place. The project design and contract stipulations are expected to minimize the effects this project would have on wolves by limiting sight distances and not increasing motorized access, which combine to mitigate the risk of mortality to wolves. However, during harvesting activities, some foraging habitat could be avoided due to the disturbance and human presence associated with the project, resulting in negligible effects to wolves.

Cumulative Effects

- ***Cumulative Effects to Gray Wolves Common to the No-Action and Action Alternatives***

 In addition to this project, activities associated with private residences and harvesting under the *Logan Creek Ecosystem Restoration Project* provide additional mortality risk and reduction of visual screening. The human disturbance and habitat alteration associated with these activities could result in habitat shifts away from adjacent habitats. Since these activities occur away from den and rendezvous sites, these habitat shifts are expected to result in negligible effects to wolves.

➢ **Grizzly Bear**

Issue: Human access could result in increased mortality risk to grizzly bears using the area.

This issue will be dismissed based on the following rationale. Under all alternatives, motorized access would not change and existing closure devises would be reinforced to reduce illegal motorized use. Grizzly bears tend to use areas away from human disturbance. Where human activities occur, bear use declines or bears shift to a more nocturnal schedule. The effects of human impacts varies dependent upon the season of activities. Timber harvests could affect grizzly bears through motorized disturbance and/or altering the distribution of forage and cover resources in the area. Currently, the project area contains 1.7

miles of the unrestricted Star Meadows and Good Creek roads. These open roads occur in Section 14. An additional 0.8 miles of bermed and 6.7 miles of gated restricted roads provide good access into the project area. However, ATV users periodically breach the gate that restricts the 6.7-mile road system. Under the action alternative, no additional roads would be constructed, the current road management would continue, and the gate closure would be reinforced to reduce illegal access.

Issue: Timber harvesting activities could reduce grizzly bear habitat in the analysis area.

The project is outside the Northern Continental Divide Ecosystem (NCDE) recovery area, but within the current occupied habitat of bears associated with the NCDE.

DFWP monitors radio-collared grizzly bears for long-term population trends and monitors habituated bears to prevent human-bear conflicts. These efforts did not document grizzly bear presence in the project area. However, residents near the project area reported seeing grizzly bears in the area. Use of the area appears to be occurring, but the specific level of bear use is unknown.

The project area provides several potential high quality foraging areas. These areas include Shorts Meadow, 2 other wetlands, and the riparian areas associated with North Evers Creek. These sites provide primarily spring and summer forage items. The uplands provide low-density berry-producing plants. Therefore, key foraging sites in the project area are likely limited to the riparian-associated habitats. Timber harvesting could reduce the potential use of these areas by removing security cover and/or by increasing nearby disturbance.

To assess cumulative effects, the project area and adjacent sections were considered. This area encompasses 9,587 acres of Tally Lake Ranger District (60.3 percent), Montana DNRC-managed lands (15.1 percent), Plum Creek Timber Company (6.1 percent), and other private property (18.5 percent). Timber harvests occurred on adjacent lands in the recent past. These areas are currently regenerating. In addition to timber harvests, recreational use of the Tally Lake Campground occurs during the spring, summer, and autumn.

Alternative Effects to Grizzly Bears

Direct and Indirect Effects

- ***Direct and Indirect Effects of the No-Action Alternative to Grizzly Bears***

 Key feeding sites within the project area would not be affected, and no additional disturbance in the project area would occur. Therefore, no effects to grizzly bears are expected under this alternative.

- ***Direct and Indirect Effects of the Action Alternative to Grizzly Bears***

 Harvesting activities and log hauling during the nondenning period would cause high levels of disturbance that would likely discourage bear use in the project area when harvesting activities are occurring. No disturbance would occur if harvesting and hauling take place during the denning season. The project design calls for retaining visual screening along all open roads and around riparian features that could provide key feeding sites to retain security for bears that might use the project area. However, bear use of the area appears to be low; therefore any effects resulting from this project are expected to be negligible.

Cumulative Effects

- ***Cumulative Effects Common to the No-Action and Action Alternatives***

 Timber harvesting would occur on adjacent USFS lands under the *Logan Creek Ecosystem Restoration Project*. Proposed activities on Plum Creek lands are unknown. Hunting and other nonmotorized activities would occur away from open roads in the analysis area. These activities could be additive to the effects proposed under the No-Action and Action Alternatives. However, since bear use in the area is likely low and transitory, the cumulative effects of these activities would likely have a negligible effect on grizzly bears using the area.

SENSITIVE SPECIES

- **Fisher**

 Issue: Timber harvesting could reduce fisher habitat availability and quality by reducing canopy cover, snag density, and the amount of coarse woody debris. Reductions in fisher habitat quantity and quality could result in adverse effects to fishers.

 Issue: Timber harvesting could remove canopy cover, which may reduce fisher habitat or impede fisher movement within their home range, resulting in decreased ability for fishers to use the analysis area.

 Fisher habitat consists of foraging, denning, and resting components. Fishers avoid areas with deep soft snow (*Buskirk and Powell 1994*) and are typically found below 6,000 feet in elevation (*Powell and Zielinski 1994*). Fishers are generalist predators that prey upon a variety of small mammals and birds, along with snowshoe hares and porcupines. They also take advantage of carrion and seasonally available fruits and berries (*Foresman 2001*). Fishers use a variety of successional stages, but are disproportionately found in stands with dense canopies (*Powell 1982, Johnson 1984, Jones 1991, Heinemeyer and Jones 1994*) and avoid openings or pole-sapling stands (*Jones 1991, Jones and Garton 1994*). However, some use of openings appears to occur for short hunting forays or if sufficient overhead cover (shrubs, saplings) is present. Fishers appear to be highly selective of stands that contain resting and denning sites (*Jones 1991*). Resting and denning sites are found in cavities of live trees and snags, downed logs, brush piles, mistletoe brooms, squirrel and raptor nests, and holes in the ground. Additionally, fishers tend to disproportionately use areas near water, presumably due to the diversity of prey and structure found in riparian areas. These riparian areas also provide travel corridors for fishers.

 To assess the effects of the proposed action on fishers, fisher habitat was modeled using the SLI data in the project area. The SLI database was searched for sawtimber stands supporting mesic covertypes with greater than 40-percent canopy closure and below 6,000 feet in elevation. These stands were further divided by their proximity to water. Stands within 100 feet of a class 1 stream, or 50 feet of a class 2 stream were considered riparian fisher habitat, while the balance of appropriate stands were considered upland fisher habitat. Based on this model, the project area contains 799 acres of upland and 46 acres of riparian fisher habitats, with 56 acres of the suitable upland covertypes in a stand condition that is not expected to be used by fishers.

 Forest management *ARM*s require that DNRC manage preferred fisher covertypes within 100 feet of

class 1 streams and 50 feet of class 2 streams, so that 75 percent of the acreage (State school trust lands only) would be in the sawtimber size class in moderate to well-stocked density (*ARM 36.11.440(1)(b)(i)*) at the project-area level. For the project area, 100 percent of the preferred covertypes within the appropriate proximity to streams are in a moderate to well-stocked condition.

For cumulative-effects analysis purposes, the project area and surrounding sections were considered. This scale includes enough area to analyze connectivity of the landscape as affected by the project area. Presently, the project area allows connectivity along streams and/or adjacent forest stands and through meadows with a dense shrub canopy.

Alternative Effects to Fishers

Direct and Indirect Effects

- ***Direct and Indirect Effects of the No-Action Alternative to Fishers***

 No fisher habitat would be harvested. Over time, fisher habitat would increase as stands continue to age and deadwood increases.

- ***Direct and Indirect Effects of the Action Alternative to Fishers***

 Harvesting would take place on 301 acres of upland and 11 acres of riparian fisher habitat. The harvest prescriptions in these units vary from seedtree to commercial thin. Where canopy cover retention exceeds 40 percent, potential fisher habitat would be retained. Where canopy cover is reduced to less than 40 percent, the area would be temporary unsuitable for fishers until sawtimber and canopy closure redevelops. In all units, except Unit 4, a majority of canopy cover in each harvest unit would likely be reduced to less than 40 percent; therefore, all harvest unit acres were considered temporary unsuitable habitat. However, some use of the harvest units could occur if the understory or regenerating seedlings provides overhead cover. Conversely, Unit 4 would likely continue to provide habitat following harvesting, but due to the small size and proximity to water and the unrestricted road, use of this stand is expected to be low. Where riparian fisher habitat is harvested within 50 feet of the streams, the SMZ law requires that 50 percent of the trees be retained. This retention is expected to maintain enough canopy cover to provide fisher habitat. Since fishers are unlikely to use areas adjacent to hard edges (*Heinemeyer and Jones 1994*), fisher use of these areas is expected to be low. Therefore, where less than 40 percent canopy cover is expected following harvests, all habitat was considered removed. Following harvesting, 35 acres (76.1 percent) of riparian habitat would be retained in a condition used by fishers, meeting *ARM 36.11.440(1)(b)(i)*. In addition, forested cover would be retained on the other side of the stream from the harvest units and within the SMZ (50 feet); therefore, movement corridors are expected to be retained. Although fisher habitat would be removed or decreased in quality, 485 acres (60.7 percent) of upland and 35 acres (76.1 percent) of riparian fisher habitat would be retained in the project area. These acres could continue to provide some habitat and movement corridors. As other stands continue to age, fisher habitat could be increased. Therefore, negligible effects to fishers are expected due to this alternative.

Cumulative Effects

- ***Cumulative Effects to Fishers Common to the No-Action and Action Alternatives***

 In addition to the effects discussed above, timber harvesting is planned for the adjacent sections of USFS lands. Approximately, 36 acres of additional habitat would be removed from the analysis area, while habitat quality could be reduced on another 120 acres. Public firewood gathering would continue to remove deadwood needed by fishers, primarily adjacent to open roads. Taken cumulatively, fisher habitat and movement corridors would be retained throughout the project area and on adjacent lands under either alternative. Therefore, negligible effects are expected under each alternative; however, less effect would occur under the No-Action Alternative.

➢ **Pileated Woodpecker**

Issue: Timber harvesting would reduce canopy cover and structure needed for pileated woodpecker habitat.

DNRC defines pileated woodpecker habitat as "live mature cottonwood stands and mature conifer forests with overstory canopies dominated by large-sized western larch or ponderosa pine, and containing Douglas-fir, large snags, and coarse woody debris" (*ARM 36.11.403[58]*). Based on this definition, DNRC-managed lands within the analysis area support 200 acres of pileated woodpecker habitat in 6 patches. Two of the 6 patches exceed 40 acres in size (41 and 77 acres). The remaining patches are scattered near the larger patches. However, field observations indicated a general lack of large snags needed by pileated woodpeckers for foraging and nesting. In addition to habitat on DNRC-managed lands, aerial photographical interpretation identified an additional 1,476 acres of potential habitat on adjacent lands (primarily USFS lands) within the analysis area. Combined, the 9,587-acre analysis area contains an estimated 1,676 acres (17.5 percent) of pileated woodpecker habitat. Timber harvesting on much of the managed lands appears to have removed the canopy cover and, potentially, the structure required by pileated woodpeckers. Many of these stands have regenerated to provide some level of overstory canopy, but do not appear to have many large trees or snags intermixed within the stand. Therefore, pileated habitat is limited in the analysis area; however, on several occasions, pileated woodpecker use was documented in the project area.

Alternative Effects to Pileated Woodpeckers

Direct and Indirect Effects

- ***Direct and Indirect Effects of the No-Action Alternative to Pileated Woodpeckers***

 The amount and quality of pileated woodpecker habitat would remain unchanged in the project area in the short-term. In the longer term, the current timber stands would likely produce larger trees and snags, which could increase the amount of habitat available for pileated use. This alternative would result in minor, long-term positive effects to pileated woodpeckers.

- ***Direct and Indirect Effects of the Action Alternative to Pileated Woodpeckers***

 Timber harvesting would reduce canopy cover on 76 acres (38 percent of the existing habitat on DNRC-managed lands) of pileated woodpecker habitat, including all habitat within the 40-acre patch and the harvesting of 30 acres within the 77-acre patch. Within each harvest

unit, the estimated historic densities of snags (*Harris 1999*) and large preferred tree species (ponderosa pine, western larch, and Douglas-fir) would be retained. Therefore, pileated woodpecker habitat could be reduced in the short term, but the structure and preferred tree species would be retained. Where 40 percent or more canopy cover is retained, pileated woodpeckers use could continue, to some degree, in the short-term, with use increasing as the retained tree canopy closes in the future.

Cumulative Effects

- ***Cumulative Effects to Pileated Woodpeckers Common to the No-Action and Action Alternatives***

 In addition to the proposed alternatives, timber harvesting on USFS lands would affect an additional 225 acres (13 percent of the cumulative-effects analysis area) under the *Logan Creek Ecosystem Restoration Project*. Additionally, firewood harvesting would continue to remove snags and downed wood, especially near open roads. The removal of deadwood reduces feeding and potential nesting structure for pileated woodpeckers. Under the No-Action Alternative, these would be the only reductions experienced in the analysis area. Under the Action Alternative, these reductions would be additive to the 76 acres proposed to be removed under this alternative, resulting in retention of 1,375 acres (14.3 percent) of pileated woodpecker habitat within the analysis area. Under either alternative, the quantity and quality of pileated woodpecker habitat would remain low, resulting in continued limited habitat for this species.

BIG GAME SPECIES

- **Winter Range**

 The project area provides habitat for white-tailed deer and elk during the nonwinter period and for moose year-round. Mule deer could move through the project area, but are not expected to use the area heavily. The project area is along a major migration corridor for white-tailed deer. Since elk and deer nonwinter habitat is not limiting and moose populations are tightly regulated through hunting permits, this analysis focuses on white-tailed deer migration and overall big game vulnerability.

 Issue: Timber harvesting could alter white-tailed deer migration to their winter range, resulting in reduced over-winter survival.

 White-tailed deer are migratory in this area. These animals spread out during the nonwinter period and migrate to the Cliff/Bowser lakes winter-range area. In milder winters, this winter range extends north of Tally Lake. This winter range supports approximately 5,000 white-tailed deer during the winter period (*personal communication A. Wood, DFWP 1/2007*). To reach these winter ranges, several animals have been documented moving through the project area. Movement through the project area requires retention of vegetation that conceals traveling animals (*Thomas 1979*). Presently, animals can move through the project area relatively undetected due to the abundance of cover.

Alternative Effects to Big Game Winter Range

Direct and Indirect Effects

- ***Direct and Indirect Effects of the No-Action Alternative to Big Game Winter Range***

 No timber would be harvested. Generally, the habitat conditions and movement corridors would remain intact, resulting in no change in habitat use or migration paths through the project area.

- ***Direct and Indirect Effects of the Action Alternative to Big Game Winter Range***

 Approximately 448 acres of forested habitats would be harvested. On a majority of the acres, hiding cover would be removed. However, the location of these units provide areas of forested or hiding cover interspersed throughout the project area, which an animal could use to successfully move through the project area. Therefore, negligible shifts in migration routes could occur.

Cumulative Effects

- ***Cumulative Effects to Big Game Winter Range Common to the No-Action and Action Alternatives***

 In addition to the effects discussed above, timber harvesting is occurring on USFS lands adjacent to the project area. These harvests could reduce the amount of cover in the area, but would not combine with either alternative to prevent big game travel through the project area or adjacent lands.

➢ **Security**

Issue: Timber harvesting and road building could reduce security for big game species. During the hunting season, individual animals could be made more vulnerable to mortality by increasing hunter access and reducing visual obstructions that allow hunters to see an animal at a distance.

The project area is located in Hunting District 102. Elk, mule deer, and white-tailed deer are hunted during a 5-week general hunting season. Moose harvests are controlled by a permit system. Currently, county and USFS roads allow motorized access into the northern portion of the project area. The remaining roads within the project area are restricted. The vegetation along these roads and within the harvest units provides visual obstructions that limit sight distances through the stands. The limited motorized access and sight distances reduce the chance of an animal being detected and killed during the hunting season.

Alternative Effects to Big Game Security

Direct and Indirect Effects

- ***Direct and Indirect Effects of the No-Action Alternative to Big Game Security***

 No changes to big game vulnerability would occur.

- ***Direct and Indirect Effects of the Action Alternative to Big Game Security***

 Vegetation would be removed on 448 acres that could result in an increase in big game vulnerability. Removal of timber could increase sight distances, resulting in an increase in the distance a hunter can detect and shoot an animal. As part of the project design, visual screening would be retained along open roads, thereby decreasing big game vulnerability by reducing the distance a hunter can detect or kill an animal. Additionally, pockets of regenerating trees and shrubs would be retained within each harvest unit, along with boles of retention trees, to reduce sight distances in the harvest units. Therefore, this alternative would increase sight

distances, resulting in increased vulnerability for big game; however, mitigations are in place to limit sight distances while reaching the project objectives. This project would not result in additional changes in the management status of any roads. Taken together, the proposed project is likely to increase big game vulnerability, but with retention of visual screening along open roads and visual obstructions throughout the harvest units, the change in vulnerability is expected to result in negligible increases in mortalities of big game during the hunting season.

Cumulative Effects

- ***Cumulative Effects to Big Game Security Common to the No-Action and Action Alternatives***

 In addition to the effects discussed above, timber harvesting is currently taking place on USFS lands. These harvests would add to the effects of the Action Alternative by further reducing vegetation that would provide hiding cover. The reductions could result in habitat shifts, but are unlikely to affect ungulate population levels.

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REFERENCES

Boyd, D.K., and D.H. Pletscher. 1999. *Characteristics of Dispersal in a Colonizing Wolf Population in the Central Rocky Mountain*. Journal of Wildlife Management. 63(4): 1094-1108

DNRC, 1995. Shorts Meadow Timber Sale Project Environmental Assessment. Stillwater State Forest. Olney, MT

DNRC, 2001. Taylor South Timber Sale Project Environmental Assessment. Stillwater State Forest. Olney, MT

DNRC, 2006. Old Highway Timber Sale Project Environmental Assessment. Stillwater State Forest. Olney, MT

DNRC, 1996. State Forest Land Management Plan. Montana Department of Natural Resources and Conservation. Missoula, MT

Farns, P. 1978. *Hydrology of Mountain Watersheds, Preliminary Report.* Soil Conservation Service. Bozeman, MT

Fisher, W.C., A.F. Bradley. 1987. Fire Ecology of Western Montana Forest Habitat Types. USFS General Technical Report INT-223

Foresman, K.R. 2001. The Wild Mammals of Montana. Special Publication 12. American Society of Mammalogists. Allen Press, Kansas. 278pp

Graham, Russell T., Alan E. Harvey, Martine F. Jurgensen, Theresa B. Jain, Jonelea R. Tonn, and Deborah S. Page-Demroese. 1994. Managing Coarse Woody Debris in Forests of the Rocky Mountains. Research Paper INT-RP-477. Moscow, ID: USDA, Forest Service, Intermountain Research Station

Green, P., J. Joy, D. Sirucek, W. Hann, A. Zack, and B. Naumann. 1992. Old-Growth Fores Types of the Northern Region. USDA, Forest Service, Northern Region, Region 1, Missoula, MT

Harris, R.D. 1999. *Abundance and Characteristics of Snags in Western Montana Forests*. USDA Forest Service General Technical Report RMRS-GTR-31. Rocky Mountain Research Station, Ogden, UT. 19pp

Haupt, H.F., et al. 1974. Forest Hydrology Part II: Hydrologic Effects of Vegetation Manipulation. USDA Forest Service, Region 1. Missoula, MT

Heinemeyer, K., and J. Jones. 1994. Fisher Biology and Management in the Western United States: A literature Review and Adaptive Management Strategy. USDA Forest Service Northern Region, Missoula, MT. 108pp

Johnson, S. 1984. Home Range, Movements, and Habitat Use of Fishers in Wisconsin. M.S. Thesis, University of Wisconsin, Stevens Point. 78pp

Jones, J.L. 1991. Habitat Use of Fisher in Northcentral Idaho. M.S. Thesis, Univsity of Idaho, Moscow, ID. 147pp

Jones, J.L., and E.O. Garton. 1994. *Selection of Successional Stages by Fishers in Northcentral Idaho*. Pages 377-387 *in* Buskirk, S.W., A.S. Harestad, M.G. Raphael, and R.A. Powell, eds. Martens, Sables, and Fishers: Biology and Conservation. Cornell University Press, NY

Keegan, C. 2006. *Montana Sawlog and Veneer Price Report.* Business and Economic Research. Director of Forest Industry Research.

Leaf, Charles F. 1975. *Watershed Management in the Rocky Mountain Subalpine Zone: The Status of Our Knowledge.* Research Paper RM137. USDA Forest Service, Rocky Mountain Forest and Range Experiment Station. Ft. Collins, CO

Losensky, B.J. 1997. Historical Vegetation of Montana. Montana DNRC. Missoula, MT

Montana Natural Heritage Program. 2006. *Animal and Plant Species of Concern.* Montana Natural Resource Information System.

Pfister, R., B. Kovalchik, S. Arno, and R. Presby. 1977. Forest Habitat Types of Montana. USDA Forest Service. General Technical Report INT-34. Intermountain Forest and Range Experimental Station. Ogden, UT

Powell, R., and W.J. Zielinski. 1994. *Fisher*. Pages 38-73 *in* Ruggiero, L.F., K.B. Aubry, S.W. Buskirk, L.J. Lyon, W.J. Zielinski, eds. The Scientific Basis for Conserving Forest Carnivores: American Marten, Fisher, Lynx, and Wolverine in the Western United States. US Forest Service General Technical Report RM-254. 184pp

Rosgen, David L. 1996. *Applied River Morphology.* Wildland Hydrology, Pagosa Springs, CO.

Thomas, JW. 1979. Wildlife Habitats in Managed Forests: The Blue Mountains of Oregon and Washington. US Forest Service Agriculture Handbook 553. 512pp

Troendle, Charles A. 1987. *The Potential Effect of Partial Cutting and Thinning Streamflow from the Subalpine Forest.* Rocky Mountain Forest and Range Experiment Station.

USDA Forest Service. 1998. *"WATERSHED" CONDITION - Rating Standards for Form KNF-2670-BT1 through BT5*. Kootenai National Forest.

USDA Forest Service. 2004. *Logan Creek Ecosystem Restoration Project Record of Decision*. Flathead National Forest.

U.S. Fish and Wildlife Service, Nez Perce Tribe, National Park Service, and USDA Wildlife Services. 2004. Rocky Mountain Wolf Recovery 2003 Annual Report. T. Meier, ed. USFWS, Ecological Services, 100 N. Park, Suite 320, Helena MT. 65 pp

U.S. Fish and Wildlife Service, Nez Perce Tribe, National Park Service, Montana Fish, Wildlife and Parks, Idaho Fish and Game, and USDA Wildlife Services. 2005. Rocky Mountain Wolf Recovery 2004 Annual Report. D. Boyd, editor, USFWS, Ecological Services, 100 N. Park, Suite 320, Helena MT. 72 pp

U.S. Fish and Wildlife Service, Nez Perce Tribe, National Park Service, Montana Fish, Wildlife and Parks, Idaho Fish and Game, and USDA Wildlife Services. 2006. Rocky Mountain Wolf Recovery 2005 Annual Report. Sime, C.A., and E. E. Bangs, eds. USFWS, Ecological Services, 585 Shepard Way, Helena, Montana. 59601. 130pp

Wildlife Services. 2003. Rocky Mountain Wolf Recovery 2002 Annual Report. T. Meier, ed. USFWS, Ecological Services, 100 N. Park, Suite 320, Helena MT. 64 pp

STIPULATIONS AND SPECIFICATIONS

Stipulations and specifications for the Action Alternative was identified or designed to prevent or reduce potential effects to resources considered in this analysis. In part, stipulations and specifications are a direct result of issue identification and resource concerns. This section is organized by resource.

Stipulations and specifications are contained within the Timber Sale Contract and apply to the required operations occurring during the contract period. As such, they are binding and enforceable. Project administrators will enforce stipulations and specifications relating to activities such as hazard reduction, site preparation, and planting that may occur during or after the contract period.

The following stipulations and specifications will be incorporated into the Action Alternative to mitigate potential effects to resources.

VEGETATION

➢ ***SNAG RETENTION***

- Where available, 2 snags and 2 trees (snag recruits), 21 inches dbh or greater per acre will be retained.
- High-quality wildlife trees/ snags, such as large, broken-topped western larch, will be designated for retention.

➢ ***NOXIOUS WEED MANAGEMENT***

- Off-road equipment will be cleaned of noxious weeds prior to beginning project operations. The contract-administrating officer will inspect equipment periodically during project implementation.
- Prompt vegetation seeding of disturbed roadside sites will be required. Roads used and closed as part of this proposal will be reshaped and reseeded.
- Herbicide weed spraying may be implemented on roads being abandoned following the timber sale project.
- Herbicide weed spraying will be implemented on closed roads used in the timber sale project before roadwork takes place and for the next 2 years.

➢ ***FUELS MANAGEMENT***

- Within 1,000 feet of residences, the High Standard specifications of the State Hazard Reduction Law will be met. In part, 90 percent of the logging slash along the perimeter of the harvest units will be piled and burned.
- Ten to 15 tons of large woody debris will be retained on the forest floor following site preparation.

WATERSHED AND FISHERIES

- Harvesting will not occur within 100 feet of the main channel of Evers Creek.
- Along the North Fork of Evers Creek, a 100-foot (50-foot on slopes less than 35 percent) SMZs will have limited harvesting and a majority of the shrubs and submerchantable trees will be maintained.
- Planned erosion-control measures include:
 - grade breaks on roads and skid trails,
 - surface water-diverting mechanisms on roads,
 - slash-filter windrows, and

- grass seeding.

- Details for these control measures will be included in *ATTACHMENT B* of the *TIMBER SALE AGREE*MENT.
- Brush will be removed from existing road prisms to allow for effective road maintenance. Road maintenance will reduce sediment delivery.
- The contractor will be responsible for the immediate cleanup of any spills (fuel, oil, dirt, etc.) that may affect water quality.
- The BMP audit process will continue. This sale will likely be reviewed in an internal audit and may be picked at random as a State-wide audit site.

SOILS

➢ ***SOIL COMPACTION***

- Logging equipment will not operate off forest roads unless:
 - soil moisture is less than 20 percent,
 - soil is frozen to a depth that will support machine operations, or
 - soil is snow-covered to a depth that will prevent compaction, rutting, or displacement.
- Existing skid trails and landings will be used where their design is consistent with prescribed treatments and meets current BMP guidelines.
- Designated skid trails will be required where moist soils or short steep pitches (less than 300 feet) cannot be accessed by other logging systems. This will reduce the number of skid trails and the potential for erosion.
- The density of skid trails in a harvest area will not exceed 20 percent of the total area in a cutting unit.

➢ **SOIL DISPLACEMENT**

- Conventional ground-based skidding equipment will not be operated on steep slopes (greater than 40 percent). Soft-tracked yarders are suitable on slopes up to 55 percent with less impact than conventional tractor skidding. Cable yarding will be used on steeper slopes.
- Piling and scarification will be completed with a dozer where slopes are gentle enough to permit. Steeper slopes will have slash treatment and site preparation done with an excavator or will be broadcast burned.

➢ ***EROSION***

- Ground skidding machinery will be equipped with winchline to limit equipment operation on steeper slopes.
- Roads used by the purchaser will be reshaped and the ditches redefined following use to reduce surface erosion.
- Drain dips and gravel will be installed on roads as needed to improve road drainage and reduce maintenance needs and erosion.
- Some road sections will be repaired to upgrade the roads to design standards to reduce erosion potential and maintenance needs.
- The prompt and timely application of certified weed-free grass seed and fertilizer will be applied to all newly constructed road surfaces and cut-and-fill slopes. These applications will also be applied to any existing disturbed cut-and-fill slopes and landings immediately adjacent to open roads. These measures, which will stabilize soils and reduce or prevent noxious weed establishmentto include:

 - seeding all disturbed road cuts and fills concurrent with construction, and
 - seeding the surfaces of all roads where motorized use will be restricted.
- Based on ground and weather conditions, water bars, logging-slash barriers, and, in some cases, temporary culverts will be installed on skid trails where erosion is anticipated, as directed by the forest officer. These erosion-control features will be periodically inspected and maintained throughout the contract period or extensions thereof.

ROAD MANAGEMENT

New roads and roads that have been newly reconstructed may be seasonally restricted with gates when soils and road surfaces are most susceptible to rutting.

AIR QUALITY

- To prevent individual or cumulative effects during burning operations, burning will be done in compliance with the Montana Airshed Group reporting regulations and burning restrictions imposed in Airshed 2. This will provide for burning during acceptable ventilation and dispersion conditions.
- Ignition should be coordinated with other major burning operations unless the Montana Airshed Group has designated a “free burn day”.
- Excavator, landing, and roadwork debris will be piled clean to allow trouble-free ignition during fall and spring when ventilation is good and surrounding fuels are wet. The Forest Officer may require that piles be covered to reduce dispersed (unentrained) smoke. Covered piles are drier, ignite easier, burn hotter, and extinguish sooner.
- In order to reduce smoke production, large woody debris will be left on site to minimize the number and size of burn piles.
- Depending on seasonal conditions and the level of public traffic, dust-abatement application may be required on some road segments.

AESTHETICS

- Damaged residual vegetation will be slashed.
- A commercial-thin treatment method willd be employed in the proposed harvest areas adjacent to Star Meadows Road or some of the larger wetlands. This ‘feathering’ technique will be used to reduce the sharpness of the edge between harvest units and adjacent unharvested stands.
- Pockets of sawtimber-sized hardwoods (aspen, birch, and cottonwood) will be retained. Individual large-diameter hardwoods may be left as snag replacement trees.
- Landings will be limited in size and number and located away from main roads when possible.
- Disturbed sites along road right-of-ways will be grass seeded.
- Vegetation will be retained along open roads.
- Harvest unit boundaries will be irregularly shaped.

ARCHAEOLOGY

- A contract clause provides for suspending operations if cultural resources were discovered; DNRC’s archeologist will be consulted and operations may only resume as directed by the Forest Officer.
- If cultural resources were discovered, the Confederated Salish-Kootenai Tribe will be notified, as requested.

WILDLIFE

- If a threatened or endangered species is encountered, a DNRC biologist would be consulted. The biologist would develop additional mitigations that are consistent with the administrative rules for managing threatened and endangered species *(ARM 36.11.428 through 435).*
- Reclose roads and skid trails that were opened with the proposed activities to reduce the potential for unauthorized motor vehicle use.
- Using signs or other measures, restrict public access on restricted roads that were opened with the proposed activities.
- Use a combination of topography, group retention, and roadside vegetation to reduce views into harvest units along open roads.
- When possible, retain forested corridors to maintain landscape connectivity and patches of dense vegetation to provide security cover.
- Manage for snags, snag recruits, and coarse woody debris according to *ARM 36.11.411* through *414*; in particular, favoring western larch and ponderosa pine.
- Prohibit contractors and purchasers conducting contract operations from carrying firearms while operating on restricted roads.

GLOSSARY

Administrative road use
Road use that is restricted to DNRC personnel and contractors or for purposes such as monitoring, forest improvement, fire control, hazard reduction, etc.

Airshed
An area defined by a certain set of air conditions; typically, a mountain valley in which air movement is constrained by natural conditions such as topography.

Bald eagle home range
A circular area having a radius of 2.5 miles around a nest site that has been active within 5 years, or an area that has been defined in a *Bald Eagle Site-Specific Plan*.

Basal area
A measure of the number of square feet of space occupied by the stem of a tree.

Best Management Practices (BMPs)
Guidelines to direct forest activities, such as logging and road construction, for the protection of soils and water quality.

Biodiversity
The variety of life and its processes, including the variety of living organisms, the genetic differences among them, and the communities and ecosystems in which they occur.

Board foot
144 cubic inches of wood that is equivalent to a piece of lumber 1 inch thick by 1 foot wide by 1 foot long.

Canopy
The upper level of a forest consisting of branches and leaves of the taller trees.

Canopy closure
The percentage of a given area covered by the crowns, or canopies, of trees.

Cavity
A hollow excavated in trees by birds or other animals. Cavities are used for roosting and reproduction by many birds and mammals.

Coarse down woody material
Dead trees within a forest stand that have fallen and begun decomposing on the forest floor.

Co-dominant tree
A tree that extends its crown into the canopy, receiving direct sunlight from above and limited sunlight on its sides. One or more sides are crowded by the crowns of other trees.

Compaction
Increased soil density caused by force exerted at the soil surface, modifying aeration and nutrient availability.

Connectivity
The quality, extent, or state of being joined; unity; the opposite of fragmentation.

Cover
See *Hiding cover* and/or *Thermal cover.*

Covertype
A classification of timber stands based on the percentage of tree species composition.

Crown cover or crown closure
The percentage of a given area covered by the crowns of trees

Cull
A tree of such poor quality that it has no merchantable value in terms of the product being cut.

Cutting units
Areas of timber proposed for harvesting.

Cumulative effect
The impact on the environment that results from the incremental impact of the action when added to other actions. Cumulative impacts can also result from individually minor actions, but collectively they may compound the effect of the actions.

Desired future conditions
Describes the set of forest conditions determined by DNRC to best meet the SFLMP objectives. The 4 main components useful for describing an appropriate mix of conditions are covertype proportions, age class distributions, stand structural characteristics, and the spatial relationships of stands (size, shape, location, etc.), all assessed across the landscape.

Direct effect
Effects on the environment that occur at the same time and place as the initial cause or action.

Ditch relief
A method of draining water from roads using ditches and corrugated metal pipe. The pipe is placed just under the surface of the road.

Dominant tree
Those trees within a forest stand that extend their crowns above surrounding trees and capture sunlight from above and around the crown.

Drain dip
A graded depression built into a road to divert water and prevent soil erosion.

Ecosystem
An interacting system of living organisms and the land and water that make up their environment; the home place of all living things, including humans.

Environmental effects
The impacts or effects of a project on the natural and human environment.

Equivalent clearcut acres (ECA)
This method equates area harvested and percent of crown removed with an equivalent amount of clearcut area.

Allowable ECA - The estimated number of acres that can be clearcut before stream channel stability is affected.

Existing ECA - The number of acres that have been previously harvested, taking into account the degree of hydrologic recovery that has occurred due to revegetation.

Remaining ECA - The calculated amount of harvesting that may occur without substantially increasing the risk of causing detrimental effects to the stability of the stream channel.

Evaportranspiration
A combination of 2 physical processes in the environment: evaporation is the loss of moisture into the atmosphere from the soil and bodies of water (lakes, river, etc.); transpiration is the process where moisture is lost through the surfaces of plants and trees into the atmosphere. Both are the result of heating by the sun, and the combination of the 2 is how moisture is cycled back into the atmosphere.

Excavator piling
The piling of logging residue using an excavator.

Fire regimes
Describes the frequency, type, and severity of wildfires. Examples include: frequent nonlethal underburns; mixed-severity fires; and stand-replacement or lethal burns.

Forage
All browse and nonwoody plants available to wildlife for grazing.

Forest improvement
The establishment and growing of trees after a site has been harvested. Associated activities include:

– site preparation, planting,

survival checks, regeneration surveys, and stand thinnings;
- road maintenance;
- resource monitoring;
- noxious-weed management; and
- right-of-way acquisition on a State forest.

Fragmentation (forest)
A reduction of connectivity and an increase in sharp stand edges resulting when large contiguous areas of forest with similar age and structural character are interrupted through disturbance (stand-replacement fire, timber harvesting, etc.)

Habitat
The place where a plant or animal naturally or normally lives and grows.

Habitat type
The place or type of site where a plant or animal naturally or normally lives and grows.

Hazard reduction
The reduction of fire hazard by processing logging residue with methods such as separation, removal, scattering, lopping, crushing, piling and burning, broadcast burning, burying, and chipping.

Hiding cover
Vegetation capable of hiding some specified portion of a standing adult mammal from human view at a distance of 200 feet.

Historical forest condition
The condition of the forest prior to settlement by Europeans.

Homogeneous
Of uniform structure or composition throughout.

Indirect Effects
Secondary effects that occur in locations other than the initial action or significantly later in time.

Intermediate trees
A characteristic of certain tree species that allows them to survive in relatively low light conditions, although they may not thrive.

Interdisciplinary team (ID Team)
A team of resource specialists brought together to analyze the effects of a project on the environment.

Landscape
An area of land with interacting ecosystems.

Meter
A measurement equaling 39.37 inches.

Mitigation measure
An action or policy designed to reduce or prevent detrimental effects.

Multistoried stands
Timber stands with 2 or more distinct stories.

No-action alternative
The option of maintaining the status quo and continuing present management activities; the proposed project would not be implemented.

Nonforested area
A naturally occurring area where trees do not establish over the long term, such as a bog, natural meadow, avalanche chute, and alpine areas.

Old growth
For this analysis, old growth is defined as stands that meet the minimum criteria (number of trees per acre that have a minimum dbh and a minimum age) for a given site (old-growth group from habitat type). These minimums can be found in the *Green et al Old Growth Forest Types of the Northern Region* (see *APPENDIX A - REFERENCES).*

Overstory
The level of the forest canopy including the crowns of dominant, codominant, and intermediate trees.

Patch
A discrete area of forest connected to other discrete forest areas by relatively narrow corridors; an ecosystem element (such as vegetation) that is relatively homogeneous internally, but differs from what surrounds it.

Project file
A public record of the analysis process, including all documents that form the basis for the project analysis. The project file for the Dog/Meadow Timber Sale project Ea is located at the Stillwater State Forest office near Olney, Montana.

Redds
The spawning ground or nest of various fish species.

Regeneration
The replacement of one forest stand by another as a result of natural seeding, sprouting, planting, or other methods.

Residual stand
Trees that remain standing following any cutting operation.

Road-construction activities
In general, the term 'road construction activities' refers to all the activities conducted while building new roads, reconstructing existing roads, and obliterating roads. These activities may include any or all of the following:

- road construction;
- right-of-way clearing;
- excavation of cut/fill material;
- installation of road-surface and ditch-drainage features;
- installation of culverts at stream crossings;
- burning right-of-way slash;
- hauling and installation of borrow material; and
- blading and shaping road surfaces.

Road improvements
Construction projects on an existing road to improve ease of travel, safety, drainage, and water quality.

Saplings
Trees 1 to 4 inches in diameter at breast height.

Sawtimber trees
Trees with a minimum dbh of 9 inches.

Scarification
The mechanized gouging and ripping of surface vegetation and letter to expose mineral soil and enhance the establishment of natural regeneration.

Scoping
The process of determining the extent of the environmental assessment task. Scoping includes public involvement to learn which issues and concerns should be addressed and the depth of assessment that will be required. It also includes a review of other factors such as laws, policies, actions by other landowners, and jurisdictions of other agencies that may affect the extent of assessment needed.

Security
For wild animals, the freedom from the likelihood of displacement or mortality due to human disturbance or confrontation.

Security habitat (grizzly bears)
An area of a minimum of 2,500 acres that is at least .3 miles from trails or roads with motorized travel and high-intensity nonmotorized use during the nondenning period.

Seedlings
Live trees less that 1 inch dbh.

Sediment
In bodies of water, solid material, mineral or organic, that is suspended and transported or deposited.

Sediment yield
The amount of sediment that is carried to streams.

Seral
Refers to a biotic community that is in a developmental, transitional stage in ecological succession.

Shade intolerant
Describes the tree species that generally can only reproduce and grow in the open or where the overstory is broken and allows sufficient sunlight to penetrate. Often these are seral species that get replaced by more shade-tolerant species during succession. In Stillwater State Forest, shade-intolerant species generally include ponderosa pine, western larch, Douglas-fir, western white pine, and lodgepole pine.

Shade tolerant
Describes tree species that can reproduce and grow under the canopy in poor sunlight conditions. These species replace less shade-tolerant species during succession. In Stillwater State Forest, shade-tolerant species generally include subalpine fir, grand fir, Douglas-fir, Engelmann spruce, and western red cedar.

Siltation
The process of very fine particles of soil (silt) settling. This may occur in streams or from runoff. An example would be the silt build-up left after a puddle evaporates.

Silviculture
The art and science of managing the establishment, composition, and growth of forests to accomplish specific objectives.

Site preparation
A hand or mechanized manipulation of a harvested site to enhance the success of regeneration. Treatments are intended to modify the soil, litter, and vegetation to create microclimate conditions conducive to the establishment and growth of desired tree species.

Slash
Branches, tree tops, and cull trees left on the ground following a harvest.

Snag
A standing dead tree or the remaining portion of a broken-off tree. Snags may provide feeding and/or nesting sites for wildlife.

Snow intercept
The action of trees and other plants in catching falling snow and preventing it from reaching the ground.

Spur roads
Low standard roads, constructed to meet minimum requirements for harvest-related traffic.

Stand
An aggregation of trees occupying a specific area that are sufficiently uniform in composition, age arrangement, and condition so as to be distinguishable from the adjoining forest.

Stand density
Number of trees per acre.

Stocking
The degree of occupancy of land by trees as measured by basal area or number of trees and as compared to a stocking standard, which is an estimate of either the basal area or number of trees per acre required to fully use the growth potential of the land.

Stream gradient
The slope of a stream along its course, usually expressed in percentage, indicating the amount of drop per 100 feet.

Stumpage
The value of standing trees in the forest. Sometimes used to mean the commercial value of standing trees.

Substrate scoring
Rating of streambed particle sizes.

Succession
The natural series of replacement of one plant (and animal) community by another over time in the absence of disturbance.

Suppressed
The condition of a tree characterized by a low-growth rate and low vigor due to competition.

Temporary road
Roads built to the minimal standards necessary to prevent impacts to water quality and provide a safe and efficient route to remove logs from the timber sale area. Following logging operations, reclamation would incorporate the following concepts to discourage future motorized use of the roads:

- Segments near the beginning of the new temporary road systems would be reshaped to their natural contours and reclaimed for approximately 200 feet by grass seeding and strewing slash and debris.
- The reclamation of the remaining road would include a combination of ripping or mechanically loosening the surface soils on the road, removing culverts or bridges that were installed, spreading forest debris along portions of the road, and allowing the surface to revegetate naturally.

Texture
A term used in visual assessments indicating distinctive or identifying features of the landscape, depending on distance.

Thermal cover
For white-tailed deer, thermal cover has 70 percent or more coniferous canopy closure at least 20 feet above the ground, generally requiring trees to be 40 feet or taller.

For elk and mule deer, thermal cover has 50 percent or more coniferous canopy closure at least 20 feet above the ground, generally requiring trees to be 40 feet or taller.

Timber-harvesting activities
Refers to all the activities conducted to facilitate timber removal before, during, and after the timber is removed. These activities may include any or all of the following:

- felling standing trees and bucking these trees into logs;
- skidding logs to a landing;
- processing, sorting, and loading logs onto trucks at the landing;
- hauling logs by truck to a mill;
- slashing and sanitizing residual vegetation damaged during logging;
- machine piling logging slash;
- burning logging slash;
- scarifying and preparing the site for planting; and
- planting trees.

Understory
The trees and other woody species growing under a, more or less, continuous cover of branches and foliage formed collectively by the overstory of adjacent trees and other woody growth.

Uneven-aged stand
Various ages and sizes of trees growing together on a uniform site.

Ungulates
Hoofed animals, such as mule deer, white-tailed deer, elk, and moose, that are mostly herbivorous and many are horned or antlered.

Vigor
The degree of health and growth of a tree or stand of trees.

Watershed
The region or area drained by a river or other body of water.

Water yield
The average annual runoff for a particular watershed expressed in acre-feet.

Water yield increase

Due to forest canopy removal, an increase in the average annual runoff over natural conditions.

Windthrow

A tree pushed over by wind. Windthrows (blowdowns) are common among shallow-rooted species and in areas where cutting or natural disturbances have reduced the density of a stand so that individual trees remain unprotected from the force of the wind.

ACRONYMS

ARM	Administrative Rules of Montana
BMP	Best Management Practices
CMP	Corrugated metal pipe
dbh	diameter at breast height
DEQ	Montana Department of Environmental Quality
DFWP	Montana Department of Fish, Wildlife and Parks
DNRC	Department of Natural Resources and Conservation
EA	Environmental Assessment
ECA	Equivalent Clearcut Acres
EIS	Environmental Impact Statement
EPA	Environmental Protection Agency
FI	Forest Improvement
FNF	Flathead National Forest
FRTA	Federal Roads and Trails Act
GIS	Geographical Information System
LAU	Lynx Analysis Unit
mbf	thousand board feet
MCA	Montana Codes Annotated
MEPA	Montana Environmental Protection Agency
MMbf	million board feet
Mbf	thousand board feet
MNHP	Montanan Natural Heritage Program
NCDE	Northern Continental Divide Ecosystem
NWLO	Northwestern Land Office
pfi	peak flow increase
RMZ	Riparian Management Zone
SFLMP	State Forest Land Management Plan
SLI	Stand Level Inventory
SMZ	Streamside Management Zone
TMDL	Total Maximum Daily Load
TRUP	Temporary Road Use Permit
UKSR	Upper Kootenai Subbasin Review
USDA	United States Department of Agriculture
USFS	United States Forest Service
USFWS	United States Fish and Wildlife Service
USGS	United States Geological Survey

ID Team	Interdisciplinary Team
Land Board	Montana Board of Land Commissioners
124 Permit	Stream protection Act Permit
318 Authorization	Authorization A—Short-term Exemption from Montana’s Surface Water Quality Standards

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